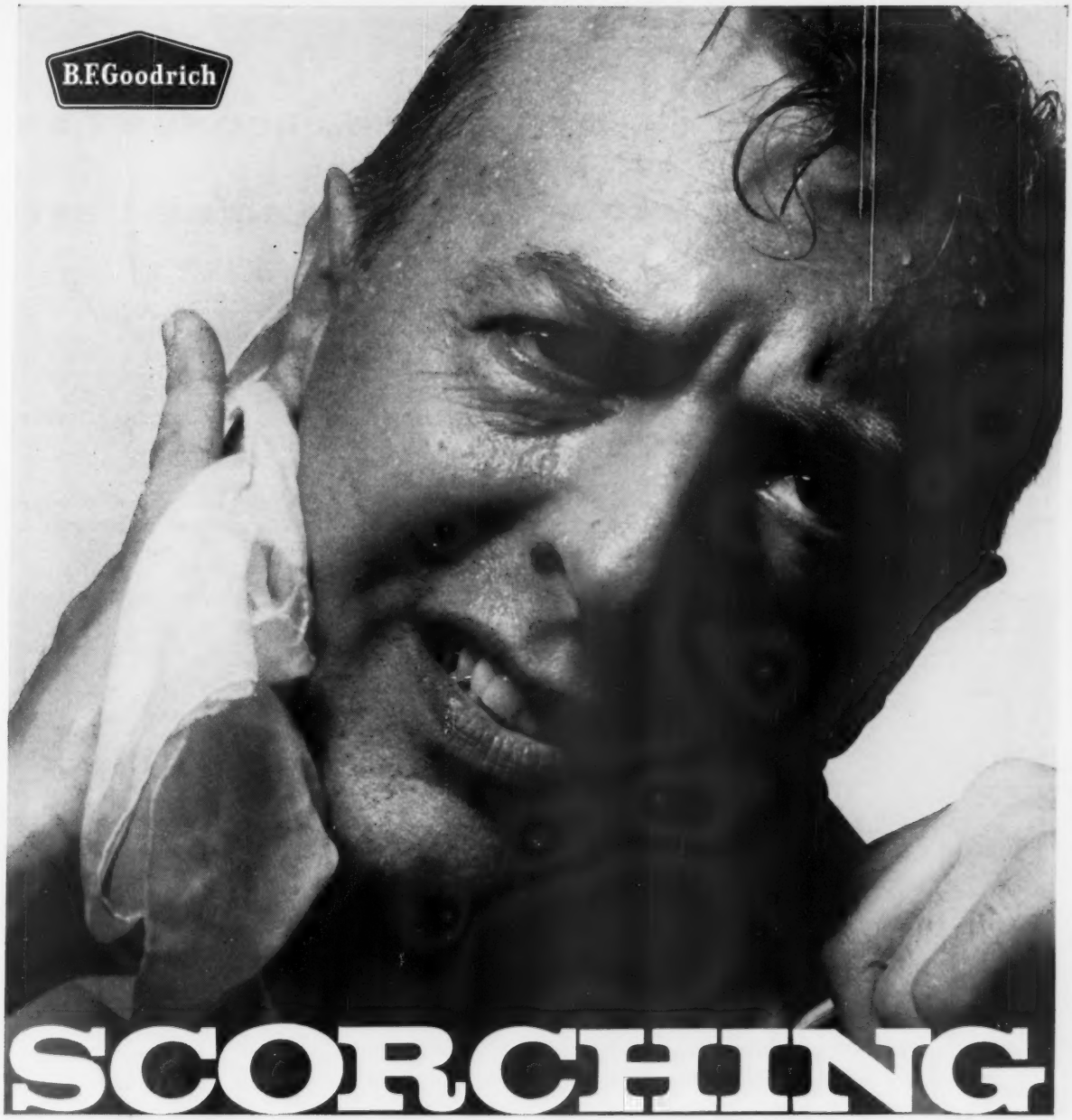


SCORCHING

summer-time is here... prepare with Good-rite Vultrol

You assure uninterrupted summer-time production by stocking up on Good-rite Vultrol. All year, Good-rite Vultrol prevents scorching by retarding cure at processing temperatures—but especially in summer. It serves as a mild activator at curing temperatures—makes possible remarkable savings in recovery of scorched stock.

Good-rite Vultrol is beneficial in the processing of highly loaded or highly accelerated compounds, too. It is particularly effective with high furnace blacks for tire-tread compounds.

No special handling is required. Good-rite Vultrol is supplied as a free-flowing flake, easy and economical to use. Get more information by writing Department MC-7, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical

a division of The B.F.Goodrich Company

Good-rite CHEMICALS

TOP QUALITY BECOMES ECONOMY AS KVP RELEASING PAPER IS USED AND RE-USED

KVP® Releasing Paper is in constant use at the Goodyear Tire and Rubber Company's plant in St. Mary's, Ohio. It is ideally suited to the handling of the highly-adhesive rubber products manufactured in this plant.

Below we see one of the steps in the production of diaphragms for industrial use. Layers of rubber are cemented together and assembled on trays covered with sheets of KVP Releasing Paper. Though extremely sticky on all surfaces, the rubber parts never cling to the releasing paper, even when weight-pressure mounts as the trays are stacked high. Nor does the paper shred, defibre or lint on to the rubber.

Yet, the high quality of KVP Releasing Paper becomes an *economy* for Goodyear because of its re-use factor. Not until the heat-treating stage is the KVP Releasing Paper discarded—then *only* because it becomes impractical to reclaim.

Most KVP Releasing Papers are tailor-made for a specific job. This is only one of many such papers produced by KVP Sutherland. It might meet your own needs. If not, we can almost certainly develop one for you that will.

We solicit the chance to solve your "sticky problems." Please write to Dept. RP3.

...the paper people

KVP SUTHERLAND PAPER COMPANY... Kalamazoo, Michigan

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

JULY, 1961 VOL. 89, NO. 4

Published Monthly by
PALMERTON PUBLISHING CO., INC.
Editorial and Advertising Offices
101 West 31st St., New York 1, N. Y.
Phone: PEnnsylvania 6-6872

P. L. PALMERTON, *President*
M. E. LERNER, *Vice-Pres. & Treas.*
E. D. OSBORN, *Secretary*
CHARLES T. JANSEN, *Asst. Treas.*

Publisher and Editorial Director
M. E. LERNER

PUBLICATION STAFF

Editor
B. J. KOTSHER

News Editor
BERNARD M. BERNS

Technical Editor
PAUL YAKE

Assistant Editors
STANLEY HOCHMAN
GERALDINE MAJOR

News Correspondents
CARL S. HOGLUND
5107 Telegraph Road
Los Angeles 22, Calif.
Phone: Angelus 1-8136

PHIL GLANZER
223 Coldstream Ave.
Toronto 12, Ont., Canada
Phone: Hudson 7-2139

Production Manager
SAMUEL SCHWARTZ

Art Director
KENNETH T. CORELL

Circulation Manager
EDITH WAHL

Advertising Sales Manager
CHARLES T. JANSEN

Advertising Representatives
GERALD F. WALTHEW
101 West 31st St.
New York 1, N. Y.

F. ROYAL CAREY
68 Shenandoah Road
Warwick, R. I.
Phone: Turner 4-9624

JIM SUMMERS & ASSOC.
35 East Wacker Drive
Chicago 1, Ill.
Phone: Andover 3-1154

CHRIS DUNKLE & ASSOC.
740 South Western Ave.
Los Angeles 5, Calif.
Phone: Dunkirk 7-6149

B. G. EDSTROM
15605 Madison Ave.
Cleveland 7, Ohio
Phone: Lakewood 1-7900

In This Issue

617 Lignite Tar Fractions as Antioxidants and Plasticizers for Rubber—By R. A. Clark and W. J. Mueller

Certain lignite tar fractions have been found useful as antioxidants for natural rubber and SBR, and as plasticizers for SBR, neoprene and nitrile rubbers.

632 Abrasion Testing on a Modified DuPont-Grasselli Abrader—By Z. Rigbi

Describing the laboratory equipment for studying abrasion characteristics of tread rubber and other compounds and the relationship of compounding and processing to abrasion resistance.

636 Elastomeric Properties of Certain Unsaturated Copolymers Containing Ethylene and Propylene—By Giulio Natta, G. Crespi, G. Mazzanti, A. Valvassori, G. Sartori and P. Scaglione

A discussion of the vulcanization of ethylene-propylene copolymers plus a report on some of the properties of the products obtained.

640 Laboratory Service Boiler Room

Centrally-housed facilities for heat, power, air conditioning, water and telephone trunk lines add to production economies.

642 How to Use a Leased Staff—By John H. Frank

Temporary help, judiciously employed, can reduce the costs involved in a fluctuating work load, in hiring and training workers, and in fringe benefits.

Special Reports

Capitol Cues	559	541	News Highlights
Markets	688	586	Overseas

Regular Departments

As Soule Sees It	577	662	Names in the News
Book Reviews	684	679	New Equipment
Canadian News	668	672	New Goods
Chemical Prices	*	670	Obituaries
Classified Ads	702	585	On the Continent
Coming Events	544	608	Patent Review
Editorial	641	666	West Coast News
Financial News	664	694	Statistics
Letters	552	*	Appears every other month

Microfilm copies of complete volumes of RUBBER AGE are available from University Microfilms, 313 North First St., Ann Arbor, Mich.
Indexed in Industrial Arts Index and Engineering Index

© Palmerton Publishing Co., Inc., 1961

RUBBER AGE is published monthly by the Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 101 West 31st Street, New York 1, N. Y. Entered as second class matter Oct. 30, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $5.00 a year; Canada, $5.50; Foreign, $6.00; Single copy, 50c. July, 1961. Vol. 89, No. 4.

HUBER

ZEOLEX 23

The unique, ultra-fine, white reinforcing pigment!

Generates less heat during mixing – gives excellent dispersion

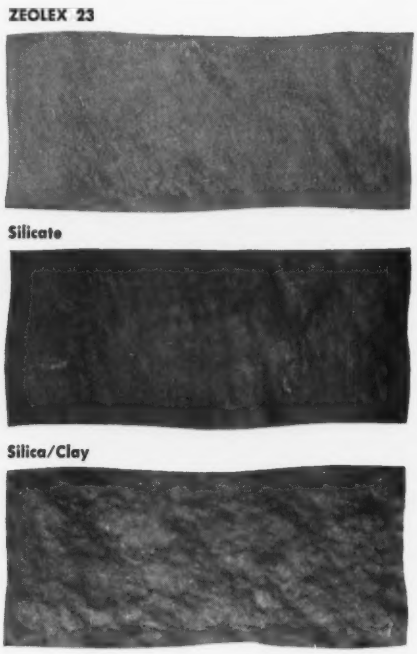
Lower plasticity – smoother raw stocks!

Heat generation during mixing

ZEOLEX 23 | Silicate | Silica/Clay

60 p.h.r.—SBR 1502

Stock smoothness



Mooney Viscosity

ZEOLEX 23	59
Silicate	62
Silica/Clay	81

MS—4′ @ 212°F.

For whiter, brighter products–use ZEOLEX® 23.

HUBER **J. M. HUBER CORPORATION** 630 Third Avenue, New York 17, N. Y.

Carbon Blacks • Clays • Rubber Chemicals

Our latest ZEOLEX 23 bulletin gives a lot of compounding information. Write for it.

Highlights Sidelights *of the News . . .*

July, 1961

The International Rubber Study Group estimates that 1961 world consumption of new rubber will reach 3.9 million long tons . . . IRSG believes that new rubber requirements in the United States in 1961 will be in the order of 1,480,000 long tons (page 644).

Goodrich has announced plans to invest an additional $2 million in an expansion and modernization of its Akron tire production facilities . . . Work on the expansion program is now underway with completion scheduled before the end of the current year (page 645).

The Bureau of the Census has been asked by a Congressman to keep better track of imported rubber footwear . . . It is stated that without detailed statistics the domestic industry is seriously handicapped in proving to the Tariff Commission that its products are "like or directly competitive" with imports (page 649).

Ross R. Ormsby, president of the Rubber Manufacturers Association, in a recent appearance before the Senate Finance Committee, declared that the rubber industry's plan for completing the Federal Highway Program on schedule and without any increase in use taxes would require less money than other proposals (page 651).

Goodrich and U.S. Rubber have signed new master contracts and wage agreements with the United Rubber Workers union thus assuring labor-management accord in the rubber industry for two years . . . Previously, Goodyear, Firestone, General Tire and Seiberling signed similar agreements (page 648).

M. E. Lerner has provided on-the-spot reports on recent meetings of the Los Angeles Rubber Group and the Southern Rubber Group . . . The Los Angeles meeting featured the presentation of eight technical papers while the Southern Rubber Group meeting featured panel discussions on antioxidants, antiozonants and waxes and on stereo-specific polymers (pages 646 and 652).

Eight papers will be presented at the forthcoming meeting of the Division of Rubber Chemistry of the Chemical Institute of Canada which will be held on August 4 in Montreal . . . Guest speaker M. F. Anderson (Dominion Rubber) will speak on "Modern Trends in the Rubber Industry" (page 653).

On our test fleet and under actual driving conditions Gentro-Jet proved its superior durability every time. Here gauges show 31% greater tread life in the tire made with Gentro-Jet 1609 SAF black masterbatch.

Gentro-Jet®

improves tread wear up to 30%!

Fleet road tests prove Gentro-Jet 1609 SAF black masterbatch offers better road wear in tires than any other commercially available rubber-black combination . . . more than 30% better wear than tires made with HAF black. Use Gentro-Jet in your formulations for improved tread wear.

GENTRO-JET BLACKMASTERS OFFER: Faster processing • Savings in shipping, storage and handling • Assures cleaner in-plant operation.

Creating Progress Through Chemistry

Chemical Division **GENERAL**
THE GENERAL TIRE & RUBBER CO.

THE GENERAL TIRE & RUBBER COMPANY
Chemical Division · Akron, Ohio

Chemicals for the rubber, paint, paper, textile, plastics and other industries: **GENTRO SBR** *rubber* • **GENTRO-JET** *black masterbatch* • **GEN-FLO** *styrene-butadiene latices* • **GEN-TAC** *vinyl pyridine latex* • **GENTHANE** *polyurethane elastomer* • **VYGEN PVC** *resins* • **KURE-BLEND** TMTD *masterbatch* • **KO-BLEND** *insoluble sulfur masterbatch*

coming events

July 17-21. Gordon Research Conferences, Elastomers, Colby Junior College, New London, N. H.

July 27-Aug. 1. International Symposium on Macromolecular Chemistry, Co-sponsored by the ACS Division of Polymer Chemistry and the IUPAC Commission on Macromolecules, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

August 4. Rubber Chemistry Division, Chemical Institute of Canada, Technical Meeting, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

August 10. New York Rubber Group, Golf Outing, Scotch Plains and Echo Lake Country Clubs, Scotch Plains and Westfield, N. J.

Aug. 14-17. Society of Automotive Engineers, National West Coast Meeting, Sheraton Hotel, Portland, Ore.

Aug. 18. Philadelphia Rubber Group, Golf Outing, Manufacturers Country Club, Oreland, Penna.

Aug. 28-Sept. 1. Gordon Research Conferences, Adhesion, New Hampton School, New Hampton, N. H.

Sept. 3-8. American Chemical Society, 140th National Meeting, Chicago, Ill.

Sept. 5. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Sept. 5-8. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

Sept. 16. Connecticut Rubber Group, Annual Outing.

Sept. 21. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Sept. 25-28. Industrial Building Exposition & Congress, New York Coliseum, New York, N. Y.

Sept. 28. Southern Ohio Rubber Group, Fall Technical Meeting.

Oct. 3. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Wolverine Hotel, Detroit, Mich.

Oct. 10. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 10-12. American Standards Association, 12th National Conference on Standards, Rice Hotel, Houston, Texas.

Oct. 12. Northern California Rubber Group, Past-Presidents' Night, Berkeley, Calif.

Oct. 13. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16-20. National Safety Council, 49th Annual Convention, Conrad Hilton Hotel, Chicago, Ill.

Oct. 20. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Oct. 20. Joint Meeting of New York, Connecticut and Philadelphia Rubber Groups, Henry Hudson Hotel, New York, N. Y.

Nov. 2. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 3. Philadelphia Rubber Group, Fall Dance, Manufacturers Country Club, Oreland, Penna.

Nov. 7. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 16. Northern California Rubber Group, Technical Meeting, Berkeley, Calif.

Nov. 17. Connecticut Rubber Group, Technical Meeting.

Nov. 17-18. Southern Rubber Group, Memphis, Tenn.

Nov. 26-Dec. 1. American Society of Mechanical Engineers, Winter Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 1. Tenth Annual Wire & Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 2. Northern California Rubber Group, Christmas Party.

Dec. 7. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 8. Detroit Rubber & Plastics Group, Christmas Party, Statler Hilton Hotel, Detroit, Mich.

Dec. 8. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 9. Southern Ohio Rubber Group, Christmas Party.

Dec. 12. Buffalo Rubber Group, Christmas Party, Buffalo Trap and Field Club, Buffalo, N. Y.

Dec. 15. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 15. New York Rubber Group, Christmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 26-31. American Association for the Advancement of Science, Chemistry Division Annual Meeting, Denver, Colo.

Jan. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Feb. 5-9, 1962. ASTM Committee Week, Statler Hilton Hotel, Dallas, Texas.

Feb. 7-9, 1962. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Statler Hilton Hotel, Dallas, Texas.

Feb. 8, 1962. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

March 2-4, 1962. Boston Rubber Group, Ski Weekend.

March 20-29, 1962. American Chemical Society, 141st National Meeting, Washington, D. C.

March 23, 1962. New York Rubber Group, Spring Meeting.

April 6, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

April 24-27, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Statler, Boston, Mass.

April 26, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

May 22-25, 1962. Institution of the Rubber Industry, 4th International Rubber Technology Conference, Church House, Westminster, London, England.

June 7, 1962. New York Rubber Group, Summer Outing.

June 22, 1962. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 24-29, 1962. ASTM Annual Meeting and Apparatus Exhibit, Hotel Statler, New York, N. Y.

August 2, 1962. New York Rubber Group, Golf Outing.

Sept. 9-14, 1962. American Chemical Society, 142nd National Meeting, Atlantic City, N. J.

Sept. 30-Oct. 5, 1962. ASTM Pacific Area Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles, Calif.

Oct. 16-19, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Cleveland, Cleveland, Ohio.

Oct. 19, 1962. New York Rubber Group, Fall Meeting.

Nov. 25-30, 1962. American Society of Mechanical Engineers, Winter-Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 14, 1962. New York Rubber Group, Christmas Party

Feb. 4-8, 1963. ASTM Committee Week, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

March 31-April 5, 1963. American Chemical Society, 143rd National Meeting, Los Angeles, Calif.

May 7-10, 1963. Division of Rubber Chemistry, American Chemical Society, Royal York Hotel, Toronto, Ontario, Canada.

Sept. 10-13, 1963. Division of Rubber Chemistry, American Chemical Society, Hotel Roosevelt, New York, N. Y.

April 28-May 1, 1964. Division of Rubber Chemistry, American Chemical Society, Sheraton-Cadillac Hotel, Detroit, Mich.

Sept. 1-4, 1964. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

May 4-7, 1965. Division of Rubber Chemistry, American Chemical Society, Fountainebleau Hotel, Miami Beach, Fla.

Oct. 19-22, 1965. Division of Rubber Chemistry, American Chemical Society Bellevue-Stratford Hotel, Philadelphia, Penna.

May 3-6, 1966. Division of Rubber Chemistry, American Chemical Society, Fairmount Hotel, San Francisco, Calif.

Sept. 13-16, 1966. Division of Rubber Chemistry, American Chemical Society, New York, N. Y.

May 2-5, 1967. Division of Rubber Chemistry, American Chemical Society, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

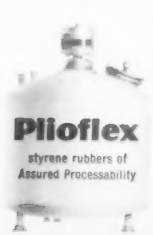
Sept. 12-15, 1967. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

PLIOFLEX "C" cuts tire cost by seven cents or more!

A Goodyear exclusive—the incorporation of WING-STAY 100 in PLIOFLEX "C" rubbers during manufacture—can mean an antiozonant saving of ¾ cents per pound of rubber or at least seven cents per tire, depending on its size.

No ordinary stabilizer, WING-STAY 100 first protects the rubber through manufacture and processing. Then it serves outstandingly well as your base antioxidant *and* antiozonant.

You rarely get something for nothing, but in PLIOFLEX "C" rubbers you get WING-STAY 100 *plus* exclusive Assured Processability—*both at no extra cost.* Choose from PLIOFLEX 1500C, 1712C or 1714C. Get full information from Goodyear, Chemical Division, Dept. G-9419, Akron 16, Ohio.

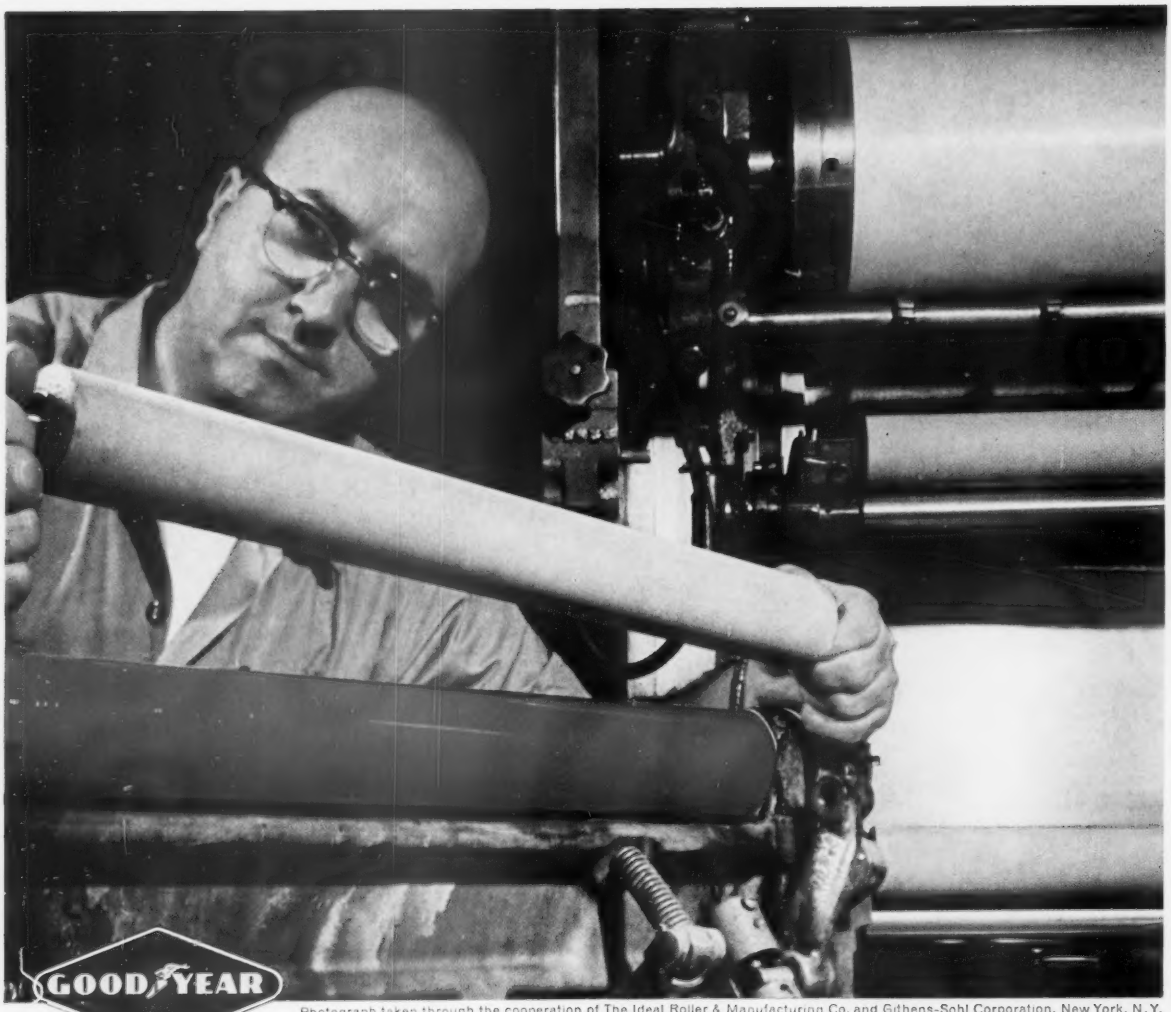


Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

Wing-Stay, Plioflex—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



Photograph taken through the cooperation of The Ideal Roller & Manufacturing Co. and Githens-Sohl Corporation, New York, N.Y.

They multiply inking roller life 16 times—with CHEMIGUM

Each new season used to call for new inking rollers on "job" printing presses. Glue composition rollers would swell, soften—even melt—in hot and humid weather. And they would shrink and harden in cool, dry weather. Valuable time was lost, printing quality varied.

A leading roller manufacturer found CHEMIGUM N-8 a year-round answer to the problem. CHEMIGUM N-8 effectively resists climatic changes. Its soft, smooth surface means proper ink pickup and release. Its oil- and solvent-resistance makes it more durable, easy to clean. What's more, CHEMIGUM is extremely easy to process, keeps costs down. And the new rollers last—not a season—but up to 4 years!

How can CHEMIGUM rubber or latex help you improve your product or enter a new market? Full details plus expert technical assistance are yours at Goodyear Chemical Division, Dept. G-9419, Akron 16, Ohio.

Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

Chemigum—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

when you need
swift service...

MUEHLSTEIN...

Raw Materials
in RUBBER
and PLASTICS

H. MUEHLSTEIN & CO. INC. 521 FIFTH AVENUE, N. Y. 17, N. Y.

REGIONAL OFFICES: Akron • Boston • Chicago • Los Angeles • Toronto • London • Hamburg

PLANTS & WAREHOUSES: Akron • Boston • Chicago • Detroit • Indianapolis • Jersey City • Los Angeles

11 OTHER U.S. DISTRIBUTION CENTERS • AGENTS IN 35 COUNTRIES

ROSS
Air Systems

Engineered Atmospheres for Better Processing

WAVINESS replaced by **UNIFORMITY**

LATEX SATURATED FABRIC shrinkage control... the major problem!

In this special application of an 'Engineered Atmosphere' the key step was not so much to control temperature, hence the drying, but rather to control shrinking. Shrinkage, because of the nature of the material, was unavoidable. The problem was to get the web to shrink uniformly across the width. This in turn called for the proper introduction, direction and circulation of the hot air stream at the right temperature. The project is working very effectively. Uneven shrinkage has been eliminated. Maximum utilization of the web by the processor is assured.

This is the kind of work that is well within the scope of Ross Engineering Service. It definitely involves the creation and maintenance of an 'Engineered Atmosphere' as do practically all drying, curing, baking, treating and similar treating and processing problems. Ross Engineers have been serving industry in this way for more than thirty-five years.

J. O. ROSS

J. O. ROSS ENGINEERING/a division of Midland-Ross Corporation
730 Third Avenue, New York 17, New York
ATLANTA • BOSTON • DETROIT • LOS ANGELES • SEATTLE • MT. PROSPECT, ILL. • MOBILE

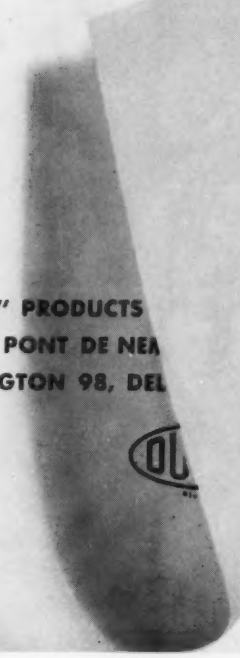
MR

FREON®

FLUOROCARBON BLOWING AGENTS

FOR

FOAMS



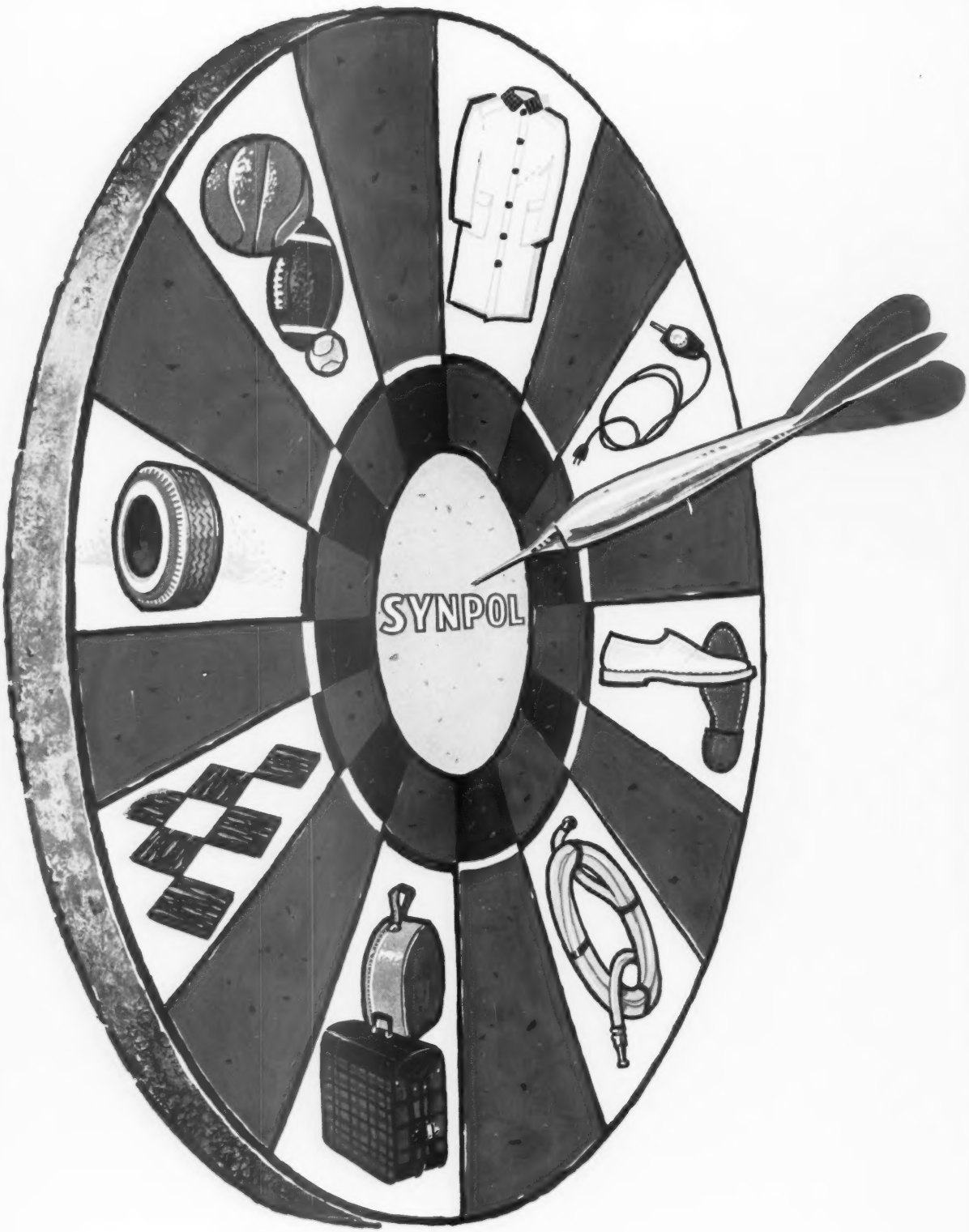
"FREON" PRODUCTS
E. I. DU PONT DE NEM
WILMINGTON 98, DEL

Get this inside story on urethanes

This is Du Pont's fact book on "Freon" blowing agents and their use with urethane foams. It is designed for day-to-day use. Each of the nine sections is self-contained and can be added to... giving charts, illustrations, graphs on every detail in foaming (check the sections alongside). It is free from Du Pont—another item in our continued program of technical assistance to engineers and designers in the field. Write, on your company letterhead please, to: Du Pont Company, "Freon" Products Division, Wilmington 98, Delaware.

FREON® blowing agents — Better Things for Better Living through Chemistry — DU PONT

PHYSICAL PROPERTIES
SHIPPING AND HANDLING
ANALYTICAL METHODS
MATERIALS OF CONSTRUCTION
TECHNICAL INFORMATION
REPRINTS
SAFETY
MANUFACTURERS AND SUPPLIERS
PRICES


SYNPOL

More than 30 SYNPOL® SBR Polymers to fit your needs

Looking for an SBR rubber to improve your product? Then don't take chances ...pick one of the more than 30 SYNPOL polymers to improve present products ...make new ones more marketable.

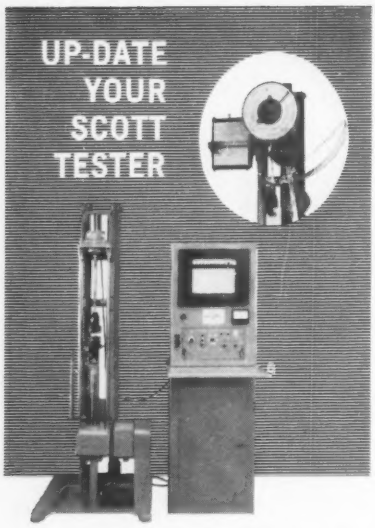
The SYNPOL line of SBR polymers means "versatility at its best" in hard, tough rubber that takes maximum abuse...in soft rubber that adds lasting resilience to so many products...in coated fabrics that are lightweight, flexible, and guard against the elements.

Does your product need color? Make SYNPOL your choice again. There are SYNPOL polymers available that may be tinted with light, bright pastel shades that won't discolor or stain...put more consumer acceptance in your products.

The world of SYNPOL is constantly enlarging. To give manufacturers new opportunities in product design, TEXUS chemists are continually developing new polymers for all types of processing...black, cold, hot, cold oil-extended, and black oil-extended. Try a SYNPOL. For information about any product application, write to the address below.

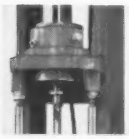
TEXUS *Pace Setter in Synthetic Rubber Technology*

TEXAS-U.S. CHEMICAL COMPANY, 9 Rockefeller Plaza, New York 20, N.Y.
JUdson 6-5220



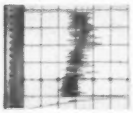
Low Cost ACCR-O-METER Conversion Kit gives you ultra-precise electronic testing—is adaptable to all Scott Tester Models in J and L Series, and Model X-3 and XL Testers.

Highly efficient and economical ACCR-O-METER Conversion Kit is essentially the load measuring system taken from the Scott Model CRE for adaptation to your vertical Scott Tester. Designed by Scott for constant-rate-of-extension testing, ACCR-O-METER gives you the advantages of easy, automatic, inertialess *electronic* testing—at modest cost! Quick, too . . . all it takes is substitution of bolted-on units. No machining, no welding. Here are just a few of the time-saving, money-saving features of the ACCR-O-METER:



INERTIALESS WEIGHING Electronic strain gage weighing eliminates weight-handling. Load cell has *interchangeable* force dividers for 30 different test capacities to 2000 lbs. . . . for greater testing convenience and economy!

PUSH-BUTTON SIMPLICITY Fingertip controls — effortless operation. Available with wide range chart speeds . . . plus "time-to-break" and "pipping" circuit for special testing. More tests per hour, in the lab, or on production!



STRESS-STRAIN PICTURIZED Electronic weighing picturizes stress-strain data on permanent strip chart, giving ample magnification for practically all materials.

Interested? Write for complete facts and prices. (Be sure to state model of your present Scott Tester.) Scott Testers Inc., 85 Blackstone Street, Providence, R. I. Tel. DExter 1-5650 (Area Code 401).

SCOTT TESTERS

THE SURE TEST . . . SCOTT!

Letters to the Editor

Our editorial on the ACS Division of Rubber Chemistry which appeared in the June, 1961, issue of this journal prompted many comments, both verbal and written. The following letters seem to express the divergent points of view about the matters discussed.

Pro . . .

Dear Sir:

Let me offer my unqualified endorsement of the thoughts and concept contained in the editorial in the June, 1961, issue of RUBBER AGE. Your observations on the technical program and hospitality suites are much to the point and call attention to a situation that could lead to the eventual undoing of the Rubber Division. There indeed seems to be a need for some remedial action.

In my opinion, the situation will never be corrected solely by placing restraints on the hospitality suites. There should be a written rule that these suites will not be run in competition with the technical sessions. However, the only way to assure good attendance at the technical papers is to come up with a good strong program that is of practical interest to the Conference. Without deemphasizing the importance of the theoretical aspects, possibly a little bit more attention to the day to day practical problems might encourage more active participation.

One other item for consideration is holding the meeting at a resort hotel where, so to speak, you have a captive audience. This eliminates the competition from meals, nightclubbing, theaters, etc., and provides everyone with an opportunity to meet and greet most of those in attendance. This would provide the proper backdrop for your suggestion for an industry sponsored hospitality suite.

You probably have a whole host of ideas much better than those mentioned above, but I am passing them along anyway for what they are worth. Again, my hearty congratulations to you and your magazine for calling this very important problem to the industry's attention.

R. W. Hagemeyer
Wyandotte Chemicals Corp.
Wyandotte, Mich.

and Con . . .

Dear Sir:

I have just read the editorial on pages 460 and 461 of the June issue of RUBBER AGE and, to say the least, I am most upset by this article.

Having been a member of the Rubber Division for some years, and having attended many meetings in various cities, I take issue with your editorial and feel that you have taken the worst of the meetings and blown them up all out of proportion.

No doubt to many the Division meetings are nothing but a Roman Holiday, however, to many more the meetings are a serious matter to which much time and thought are given by dedicated individuals.

I feel that the problems you have stated, some incorrectly, could be handled by proper action. I do not consider an editorial in RUBBER AGE to be the place to do this and can't help but feel that you have delivered a blow to the Rubber Division that may do more harm than any of the alleged abuses that your editorial cited.

George E. Herbert
Tyer Rubber Co.
Andover, Mass.

Keep Us Posted

► Rubber Manufacturers and suppliers to the rubber industry are advised to keep us posted of any personnel and product changes which may have occurred since RUBBER RED BOOK questionnaires were completed and returned to us. In this way, listings in the 1962 edition will be complete and up-to-date. Address the editor, RUBBER RED BOOK, 101 West 31st St., New York 1, N. Y.

Here it is!

The most important book on rubber since Davis & Blake's "Chemistry and Technology of Rubber"

THE APPLIED SCIENCE OF RUBBER

Edited by W. J. S. Naunton

1192 Pages 5¾ x 9 Inches Illustrated

Published in England

Price: $32.50

Includes contributions by these noted experts . . .

- A. F. Blanchard
- G. F. Bloomfield
- J. M. Buist
- E. G. Cockbain
- F. H. Cotton
- H. A. Daynes
- J. W. Denson
- A. C. Edwards
- G. N. S. Farrand
- J. Glazer
- W. A. Gurney
- M. M. Heywood
- A. J. Hirst
- C. H. Leigh-Dugmore
- E. W. Madge
- G. Martin
- L. R. Mernagh
- W. J. S. Naunton
- F. C. J. Poulton
- J. R. Scott
- J. F. Smith
- W. E. Stafford
- R. N. Thomson
- J. T. Watts
- R. A. Wright

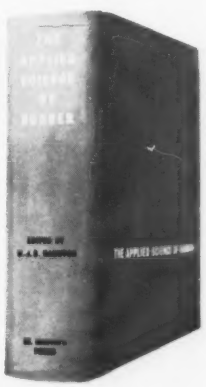
Covering these topics . . .

foam rubber—bonding of rubber to metal and textiles—antivibration mountings—vehicle suspension systems—tires—golf and tennis balls—general curing—shoes and shoe soling—formula development — compounding ingredients — latex products — etcetera, etcetera.

HERE IS AN ADVANCED comprehensive text book of rubber technology which combines theory and practice. It is written by twenty-five eminent contributors, all of whom have had extensive industrial experience. It has over 300 illustrations and bibliographies containing over two thousand references.

In compiling so comprehensive a book, which covers compounding and processing, it is essential that the contributors should have more than an academic knowledge of their subjects, and the question then arose whether the rubber industry would allow their experts to contribute frankly and without restraint to such a publication. In no case was an invited contributor refused such permission. The result is *the most practical text book on rubber published to date.*

The book has the approval and enthusiastic support of the Papers and Publication Committee of the Institution of the Rubber Industry.



CONTENTS: Natural and Synthetic Latices—Manufacture of Articles from Natural and Synthetic Latices—Chemistry and Structure of Natural Rubber—Synthetic Rubber—Design of Synthetic Rubbers—Fundamental Aspects of Reclaimed Rubber — Fundamentals of Processing—Practical Processing—Compounding and Practical Compounding—Theoretical and Basic Principles of Reinforcement—Practice and Technology of Reinforcement—Elasticity and Dynamic Properties of Rubber—Practical Applications of the Dynamic Properties of Rubber—Physical Testing of Rubber—Testing of Finished Products—Fundamentals of Hard Rubber—Analytical Methods for Rubber—Theories of Vulcanization — Practical Vulcanization — Rubber Aging, Fundamental Studies and Practical Aging—Author and Subject Indexes

MAIL THIS ORDER COUPON TODAY

Palmerton Publishing Co., Inc.
101 West 31st St., New York 1, N. Y.

Please send me ..... copy (copies) of THE APPLIED SCIENCE OF RUBBER, edited by W. J. S. Naunton, at $32.50 each.

☐ Remittance Enclosed ☐ Bill Me

Name .....

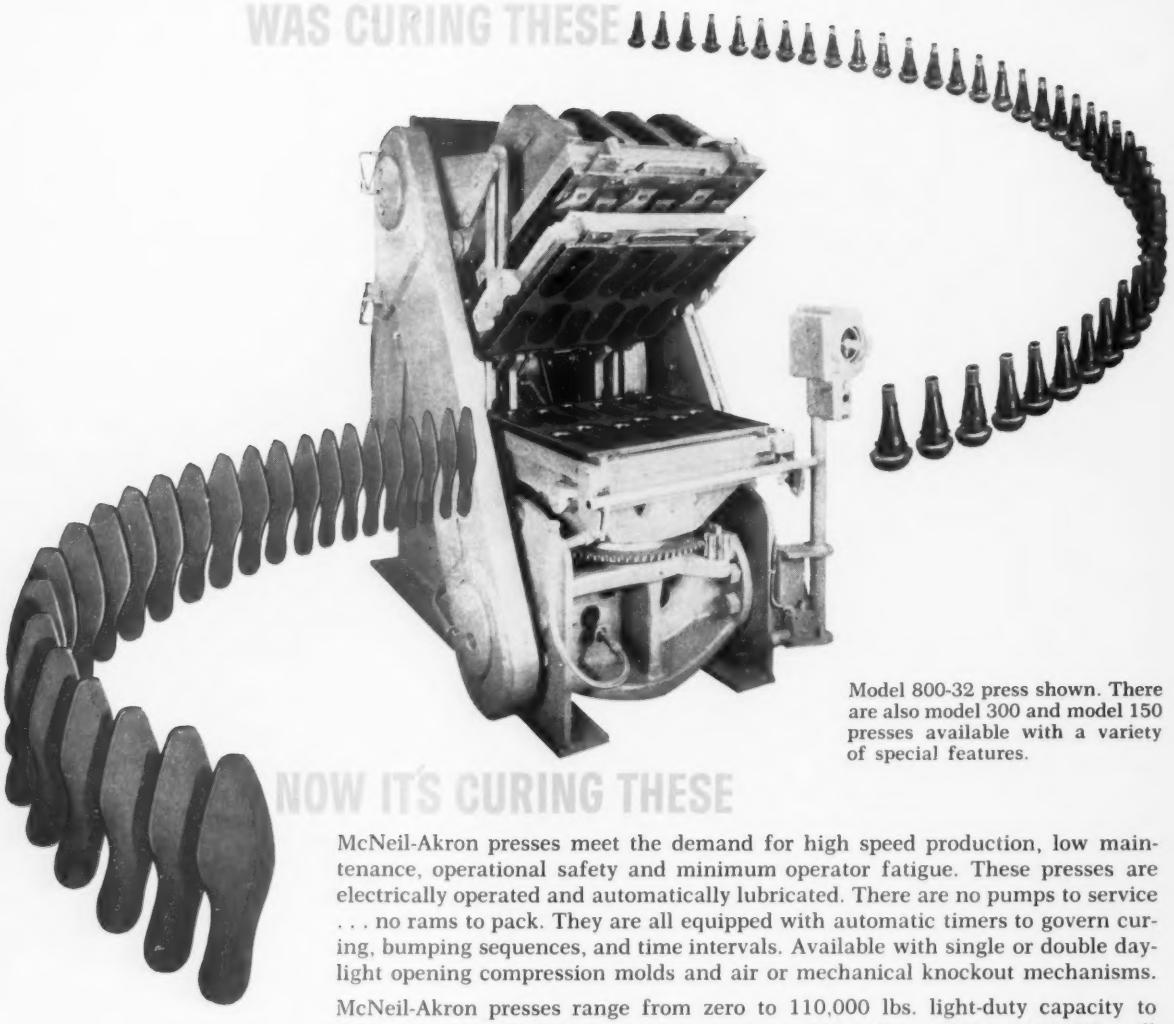
Address .....

City & Zone ..... State .....

Changeability that means Flexibility

JUST HOURS AGO THIS McNEIL AKRON PRESS

WAS CURING THESE



Model 800-32 press shown. There are also model 300 and model 150 presses available with a variety of special features.

NOW IT'S CURING THESE

McNeil-Akron presses meet the demand for high speed production, low maintenance, operational safety and minimum operator fatigue. These presses are electrically operated and automatically lubricated. There are no pumps to service . . . no rams to pack. They are all equipped with automatic timers to govern curing, bumping sequences, and time intervals. Available with single or double daylight opening compression molds and air or mechanical knockout mechanisms.

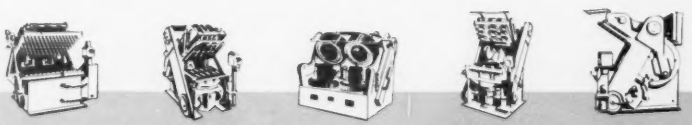
McNeil-Akron presses range from zero to 110,000 lbs. light-duty capacity to zero to 800,000 lbs. Platen sizes range from 10" x 16" to 24" x 188". We will be glad to give you complete details or help you with your molding problems. Just write or call.

THE NAME TO REMEMBER FOR PRECISION

McNEIL AKRON

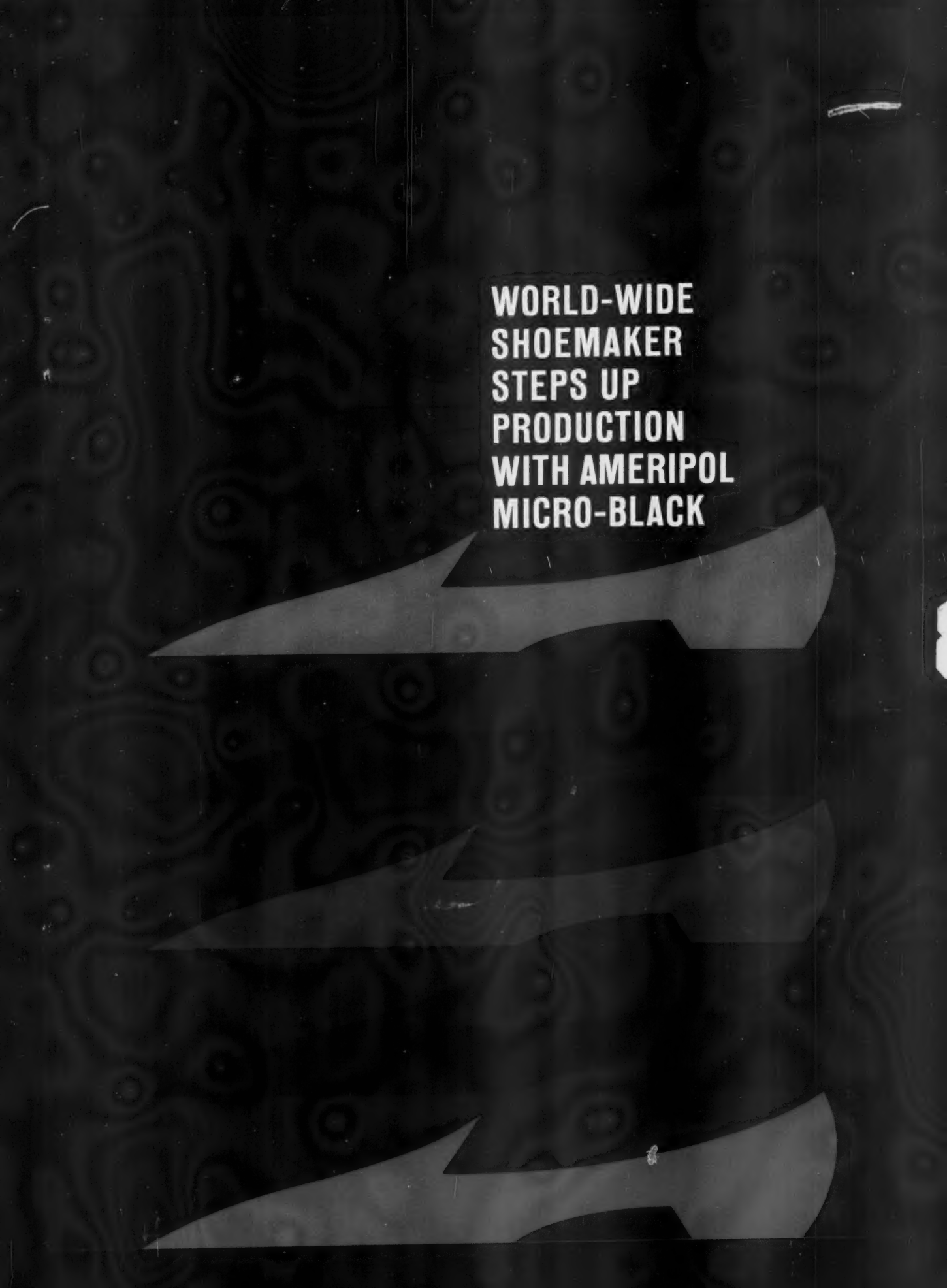
Manufacturers of the World's Finest Rubber Curing Equipment

MANUFACTURING AGENTS: Francis Shaw & Company, Ltd., Manchester, England; Vickers-Ruwolt Proprietary, Ltd., Victoria, Australia; Luigi Pomini, Soc. in Acc. di Luigi e Carlo POMINI fu Egidio e C, Castellanza, Province of Verese, Italy; Etablissements Repiquet, Bobigny (Seine), France; Harburger Eisen Und Bronze-Werke A. G., Hamburg-Harburg, Germany.



THE McNEIL MACHINE & ENGINEERING CO.

96 E. Crosier St., at Sweitzer Ave. Akron 11, Ohio


WORLD-WIDE
SHOEMAKER
STEPS UP
PRODUCTION
WITH AMERIPOL
MICRO-BLACK

BATA SHOE CUTS RUBBER MIXING TIME 20%...SAVES ON FINISHED COMPOUNDS WITH AMERIPOL MICRO-BLACK

With 64 plants, 13 tanneries, almost 4000 retail outlets, Bata Shoe Company rightly earns the title of "Shoemaker to the World." To cut production costs at their giant Belcamp Maryland plant, Bata switched to Goodrich-Gulf masterbatch.

Here's why. When using free black for their winter line of footwear, color contamination caused serious delays. Whenever a light color run followed production of black items the line had to be shut down while equipment was laboriously cleaned. A time-consuming messy job.

By changing over to Micro-Black the most delicate pastel shades can follow black with no contamination problem. Equipment, employees and production line stay clean.

That's not all. Mixing time has been cut from a two-stage to a one-stage operation, saving as much as 20% in time.

Whether you manufacture shoes, tires, camelback, coated fabrics or any other black rubber product, you will find Ameripol Micro-Black paying off in three ways.... in production by eliminating weighing and milling operations plus shortening mixing time... in storage by eliminating in-plant handling of carbon black ... in products by assuring thorough dispersion of carbon black in the rubber for increased abrasion resistance, lower heat build-up.

Goodrich-Gulf Chemicals, Inc.

WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

Tests prove Goodrich-Gulf Masterbatch Stronger

Using controlled laboratory procedures, Bata Shoe proved that the physical properties of Ameripol Micro-Black were superior to the old free mixing compound. Here are some of the critical tests in that research program:

MOONEY TEST of uncured stock determines viscosity and cure rate. Ameripol 1605 showed a more continuous uniformity of plasticity than dry-mix rubbers.

SPECIFIC GRAVITY TEST. Here Mr. H. Kinsel. Development Chemist, determines the pound volume ratio of Ameripol with precision accuracy.

DE MATTIA FLEX TEST shows that products using Ameripol 1605 have from 15-20% better flex life than those made from dry-mix masterbatch.

INSPECTION OF FINISHED PRODUCT indicates that this boot, like all footwear made with Ameripol masterbatch, features superior flexibility for longer wear.

Star Performer at Bata Shoe: Ameripol 1605 Black Masterbatch

After careful examination and tests Goodrich-Gulf and Bata agreed that Ameripol 1605—a high dispersion carbon black masterbatch — would best meet shoe production needs. And Micro-Black's performance has lived up to its reputation!

CHOOSE FROM 14 TYPES OF MICRO-BLACK

One is ideally suited to boost your rubber processing efficiency. To put Micro-Black to work on your production line call your Goodrich-Gulf Sales Engineer. Or write us at 1717 East Ninth Street, Cleveland 14, Ohio.

New Unit Pack stacks easily ... prevents contamination in shipment. Cap and sleeve construction prevents grain, dust or wood contamination. Easy to double stack ... permits four-way entry with fork trucks.

capitol cues

THE GOVERNMENT'S ANTITRUST CAMPAIGN WILL BE STEPPED UP further in months ahead. In addition to new actions by the Justice Department, there may well be major new legislation by Congress, for the first time in years. The disclosures of price-rigging in the electrical equipment industry have evoked a heavy flood of mail from irate taxpayers. As a result, lawmakers and administrators have decided that even more drastic steps are needed.

> The Justice Department's Antitrust Division has been ordered to focus its manpower on cases involving the country's basic industries--even though these are harder to win than cases of local conspiracy in, say, construction or lobster-fishing. And the Federal Trade Commission intends to get much tougher in moving against fraudulent advertising of consumer goods.
>
> On Capitol Hill, Senator Kefauver is going all-out to build a case for antitrust law amendments such as the following:
> -Stiffer penalties for individual and corporate violators.
> -Liability for top officials of a corporation even in cases where it can be shown that the executives were not involved.
> -Burden of proof to be shifted to the companies, from the government, in cases based on a series of identical bids.
> Observers give Kefauver's proposals a fairly good chance.

A NEW DRIVE TO PASS A FAIR TRADE LAW has just been launched by its supporters in Congress. They have introduced a "Fair Competitive Practices" bill--a new label to get away from the opposition to Fair Trade. But it would still let manufacturers set minimum resale prices for their products.

> The bill's backers hope for House passage this year but know that they face a tough fight in the Senate--probably in '62. But with Senator Humphrey's support, they think they'll win. There's talk Kennedy will veto any such bill. But backers recall that Truman once okayed Fair Trade after veto talk.

TALK OF AN INCOME-TAX CUT NEXT YEAR is being heard at the Treasury. Officials are thinking of substantial relief for upper-bracket taxpayers--and relatively smaller reductions for the middle and lower-income groups. The cuts would have two aims: (1) to stimulate investment in new enterprise and (2) to head off over-taxing that could limit the extent of a recovery. Officials are making no promises. They want to give the question study.

IT'S NOT TOO EARLY TO TALK OF HIGHER INTEREST RATES--maybe by Fall. To be sure, rates seemed to be easing for a time this Spring--though slowly. And officials still want to keep money loose for a while, to spur recovery.

> -Long-term rates will probably be the first to respond to the quickening tempo of the economy; indeed, borrowing by corporations and municipal governments is already heavy.
> -Short-term rates--90-day loans at commercial banks, for example--may start firming soon, too, as industry starts to accumulate new inventory and to borrow to finance it.

capitol cues (cont'd)

BUSINESS FORECASTS ARE GETTING EVER MORE OPTIMISTIC these days, as the good economic news keeps rolling in. Some economists with influence in Washington are now talking of an 8% increase in activity by the end of the year--as compared with the first-quarter recession low. This would be a climb almost as rapid as that of 1958--one of the briskest in U.S. history.

> The new programs the President has proposed will help to reinforce the increases in industrial production that have already begun and the coming upturn in business investment. Before 1962 is very old, the economy could be in a boom.

PRESIDENT KENNEDY MUST MAKE SOME TOUGH DECISIONS on foreign policy very soon, to cope with such hot spots as Cuba...Laos...Vietnam...Berlin. Pressure is mounting. Cuba hurt U.S. prestige, and the Reds are grabbing Southeast Asia. More and more, the neutrals are impressed by Soviet gains. The trouble is that none of the counter-policies open to us is attractive.

> In a nutshell, Kennedy must choose policy from three lines:
> -He can pull us out of Southeast Asia on the ground that we cannot win limited wars on the borders of Communism's core.
> -He can go back to massive retaliation, threatening to use nuclear power to curb the Reds. But they have bombs, too.
> -He can spend more for foreign aid and brushfire war, while keeping nuclear force strong. This means bigger deficits.
>
> This third approach is the one Kennedy is coming round to--reluctantly. It's the only line that even our close Allies will back. The path will be slow and frustrating. But the President has started to take the necessary steps--his new defense and aid programs...his revamping of intelligence.

CASTRO WILL CONTINUE TO RIDE HIGH IN CUBA, for a fairly long while. We're not likely to use troops, nor will we attempt to blockade him by sea. And there's little prospect of other Latin nations joining us to topple him. Only an overt act by Cuba--against Guantanamo or, say, one of our ships--would permit us to hit him openly, with support from other American states. But Castro is too smart to try anything, State Department officials believe.

KENNEDY IS SHOWING THE STRAIN of his tense foreign-policy troubles and of his varied domestic problems. He no longer is quite so confident. The criticism he has been getting has sobered him and has forced him to re-examine the way he operates. Example: He now relies more on the Cabinet and is less prone to make the vital decisions solely on his own initiative.

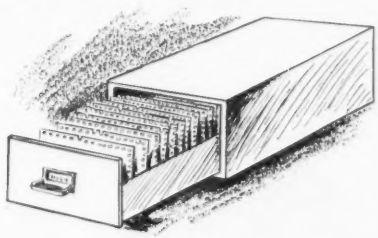
> Kennedy is doing surprisingly well on the domestic front--a fact that's been overshadowed by the loss of prestige on foreign issues. His big setback comes on his tax package. But he's made progress on several key questions--including aid to education--to the astonishment of many observers.

WATCH THE PUBLIC STATEMENTS OF TREASURY SECRETARY DILLON for a tip-off as to future economic policy. He is becoming increasingly influential in key decisions--at the expense of Kennedy's Council of Economic Advisers. These days, Dillon sees no need for crash programs to stimulate business.

There is still time
to enter your subscription
for the 1961 Edition of

THE RUBBER FORMULARY

Issued monthly, beginning January 1961.
Saves time, money, effort for compounders, salesmen, research workers, chemists, technical writers.



Here is the most complete compendium of elastomer compounds available anywhere. A compact, convenient, permanent reference file that permits instant location of compounds, according to their properties.

Published in monthly issues, each issue is furnished to the subscriber in the form of a package of file cards. These cards, containing data on a wide variety of compounds, are provided with marginal notches indexing physical properties, base ingredients, etc. To find one or more compounds with specific properties, you merely insert a sorting needle through the stack of cards. Then take your choice of formulas meeting precise specifications for hardness, elongation, tensile, etc.

Based on the number of compounds published in journals and technical releases during past years, it is expected that the 1961 issues of THE RUBBER FORMULARY will provide subscribers with 1000 or more cards during the year. THE RUBBER FORMULARY for 1954 contained 991 compounds; for 1955, 950 compounds; for 1956, 985 compounds; for 1957, 1,178 compounds; for 1958, 1,236 compounds; for 1959, 1,134 compounds, and for 1960, 1,148 compounds.

THE RUBBER FORMULARY is sold on an annual subscription basis (by calendar year) and is issued monthly. Each month's issue contains compounds published regularly in periodicals and technical releases of suppliers to the rubber industry. Each shipment is accompanied by a table of contents (in loose leaf form) listing the compounds and their sources.

PRICE: $95.00 a year

USE THIS CONVENIENT ORDER COUPON

Special Services Section
RUBBER AGE
101 West 31st Street
New York 1, New York

Gentlemen: ☐ *Please enter my subscription to THE RUBBER FORMULARY effective with the January, 1961, issue at $95 per year.*

☐ *Please send me additional information about THE RUBBER FORMULARY.*

NAME .....

COMPANY .....

ADDRESS .....

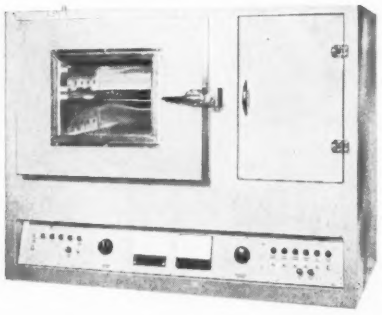
CITY—STATE .....

Reliable, Consistent Test Results With . . .

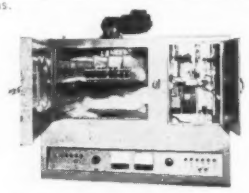
OREC 0300 *Automatically Controlled Ozone Test Chambers*

REPRESENTATIVE CUSTOMERS UTILIZING OREC OZONE TEST EQUIPMENT

Anaconda Wire & Cable Co.
E. I. DuPont de Nemours & Co.
Esso Research & Engineering Co.
Firestone Industrial Products
General Electric Company
General Tire & Rubber Co.
B. F. Goodrich Research Center
Goodrich Gulf Chemical Co.
Goodyear Tire & Rubber Co.
General Motors Corporation
Phelps Dodge Corporation
Phillips Chemical Co.
Texas U.S. Chemical Co.
TLARGI, U.S.C.
U. S. Rubber Company
Shell Chemical Corporation



Orec 0300 Series employ an *electronic-chemical loop feed back servo system to achieve and precisely maintain chamber ozone concentrations.



Orec 0300 with Dynamic Stretching Apparatus.
* *patent pending*

OZONE:

- TEST CHAMBERS, 6 MODELS
- AUTOMATIC CONTROL SYSTEMS
- RECORDING INSTRUMENTATION
- STRETCHING APPARATUS
- MEASUREMENT INSTRUMENTATION
- GENERATORS
- TESTING SERVICE
- RESEARCH & DEVELOPMENT

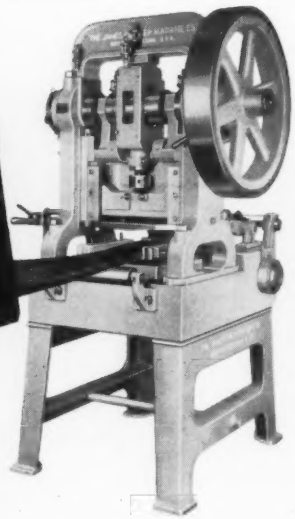
Write for illustrated brochure

Ozone Research and Equipment Corporation

3840 North 40th Avenue **Phoenix, Arizona**

Coulter...

Cutting Rubber Economically . . . Since 1896



MODEL A2
Precision cutting for multiple heels, half and full soles with stock grain.

PRECISION RUBBER CUTTING MACHINES CUT WITH OR ACROSS STOCK GRAIN

- Peak production loads
- Short runs
- Multiple heels and taps
- Half and full soles
- Mechanical rubber goods

Get top production . . . low maintenance costs . . . get a COULTER

the James COULTER *Machine Co.*
BRIDGEPORT, CONN.

Sixty-three years of job designed machines that cut your rubber efficiently . . . and your costs effectively . . . means Coulter a dependable name you can rely on.

Keeping pace with the industry, Coulter maintains a precision line of cutting machines for any peak production load or limited short run.

Write today for full information.

how to vastly increase the useful life of rubber...

Consider the effect of your curing system on the effectiveness of a chemical antiozonant

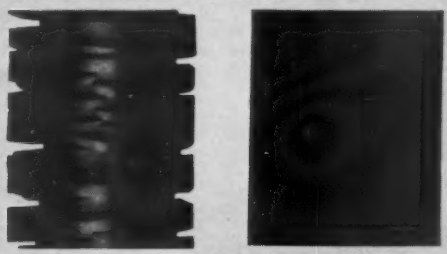
In compounding rubber, use of a potent antiozonant like UOP 88 or 288 is essential in assuring maximum crack-free life. But do you realize what a vast difference may be made by your *curing system?*

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems —a vast increase in resistance to cracking!

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

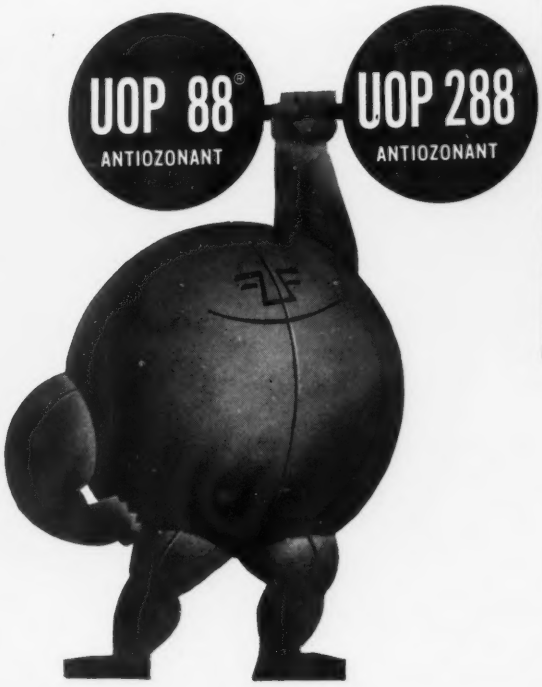
UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

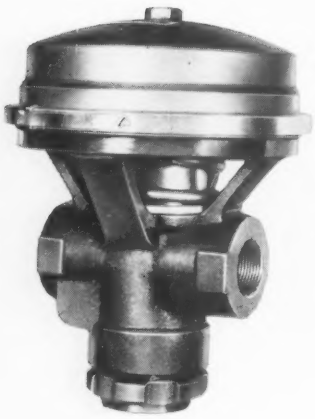
Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 230 hr.



UOP® UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road, Des Plaines, Illinois, U. S. A.

WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW



New No. 1078 Series Valve. A small, compact piston-actuated valve designed for Hot and Cold Service up to 400 psi and 400°F. Ductile iron body and spider give added strength, low coefficient of expansion. Sizes 1", 1¼" and 1½". Half the number of parts of a diaphragm operated valve, and exceptionally simple design insure long, trouble-free service.

NEW

TAYLOR 1000 SERIES AND 1078 SERIES VALVES DESIGNED FOR HOT AND COLD SERVICE

New No. 1000 Series Valve features exclusive reversible actuators for "air-to-open" or "air-to-close" service. Suitable for hot or cold service to 200 psi; cold service only up to 400 psi. Bronze body with choice of Monel seat and disc, or stainless steel bevel plug and seat of 500 Brinell hardness. Sizes range from ¼" to 3". Actuator springs completely enclosed, diaphragms of Neoprene reinforced with Nylon. Provides ideal, low-cost pneumatic control for "on-off" service. Ask your Taylor Field Engineer for full details. Or write Taylor Instrument Companies, Rochester, New York or Toronto, Ontario.

Taylor Instrument Co. (Ohio) Inc.

News in Brief

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has issued a new "Index to DuPont Technical Reports on Elastomers . . . through December 1960," covering all current technical reports on neoprene, Hypalon synthetic rubber, Viton fluoroelastomer, and DuPont rubber chemicals.

► Naugatuck Chemical, Naugatuck, Conn., is offering a booklet called "Celogen Blowing Agents," which describes advantages and chief applications of Celogen and Celogen-AZ blowing agents for rubber, polyethylene, polypropylene, vinyls and other polymeric materials.

► The Dewey and Almy Chemical Division of W. R. Grace & Co., Cambridge, Mass., is producing Daran high barrier paper coating latex in commercial quantities at its new Acton, Mass., organic chemicals plant.

► Pennsylvania Industrial Chemical Corp., Clairton, Penna., is offering its customers technical service and warehouse stocks through the W. Ron Benson Co. of Seattle, Washington, and Portland, Oregon.

► Reynolds Metals Co., Richmond, Va., has purchased the electric conductor manufacturing equipment of John A. Roebling's Son's Division of the Colorado Fuel & Iron Corp., Denver, Colo.

► Irving Barcan Co., Jersey City, N. J., is offering its latest bulletin listing a partial stock of rebuilt chemical and process machinery.

► The Synthetic Organic Chemical Manufacturers Association of the United States has moved its office to 261 Madison Avenue, New York 16, N. Y.

► Two new Escon polypropylene grades, called 107 and 117, are available in commercial quantities from Enjay Chemical Co., New York, N. Y.

► Rubber Chemicals Sales Bulletin No. 35, entitled "Dynamic Properties of *Cis*-4, Polybutadiene-Natural Rubber Blends" is available from Phillips Chemical Co., Akron, Ohio.

Flosbrene

liquid styrene-butadiene rubber

...another industry first from ASRC

FIRST TO SCORE with its cold low Mooney rubbers, ASRC now takes another forward stride with the introduction of FLOSBRENE—the first commercially available *liquid* styrene-butadiene rubber.

To many manufacturers of rubber products FLOSBRENE offers opportunities for new applications, advanced processing procedures, improved formulations. Initial customer production experience with FLOSBRENE underscores the ease with which it can be mechanically weighed, preblended, mixed and fed... its adaptability to lighter mixing equipment... the savings it provides in processing aids, mixing time, power and labor.

VISCOSITIES

FLOSBRENE is available in several different viscosity ranges as follows:

VISCOSITY—POISES		FLUID NATURE	
		Room Temp.	
25°C or 77°F	45°C or 113° F	70-75°F	150°F
VLV less than 500	—	Easy flow	Very easy flow
LV 500- 2500	—	Lazy flow	Very easy flow
MV 2500- 7500	365- 765	Thin paste	Easy flow
HV 7500-12500	765-1135	Stiff paste	Easy flow

VLV—*very low viscosity* MV—*medium viscosity*
LV—*low viscosity* HV—*high viscosity*

COMPARATIVE PROPERTIES

A comparison of the physical properties of FLOSBRENE to solid SBR is shown in the following test formula—

FLOSBRENE or SBR-1004	100
Hard rubber dust	100
Sulfur	40
Zinc Oxide	2
Organic accelerator	4

In this formula, FLOSBRENE (type VLV) gave tensile strengths of 7430 at 4.3% elongation with a hardness of 83-81. Under identical conditions, solid SBR-1004 gave a tensile strength of 7600 at 5.4% elongation with a hardness of 83-82. An additional 3 parts of sulfur added to the FLOSBRENE compound brings the physical properties even closer to the solid SBR-1004.

EXTENSIVE APPLICATIONS

FLOSBRENE offers comparative advantages in a wide variety of applications:

- For pouring or casting in conventional open-top molds where inserts can be pressed into place
- For rotational casting, as in making vinyl playballs
- For frictioning onto fabric by the calender method, for tires and belts
- For spread coating by doctor blade, as in rain-proofing or rubber coating
- As an additive to asphalt for paving, roof coverings, etc.
- As a reinforcing agent in the manufacture of high impact polystyrene resins
- As the base stock in the compounding of cements, adhesives, hard rubber products
- As an effective plasticizer for solid SBR

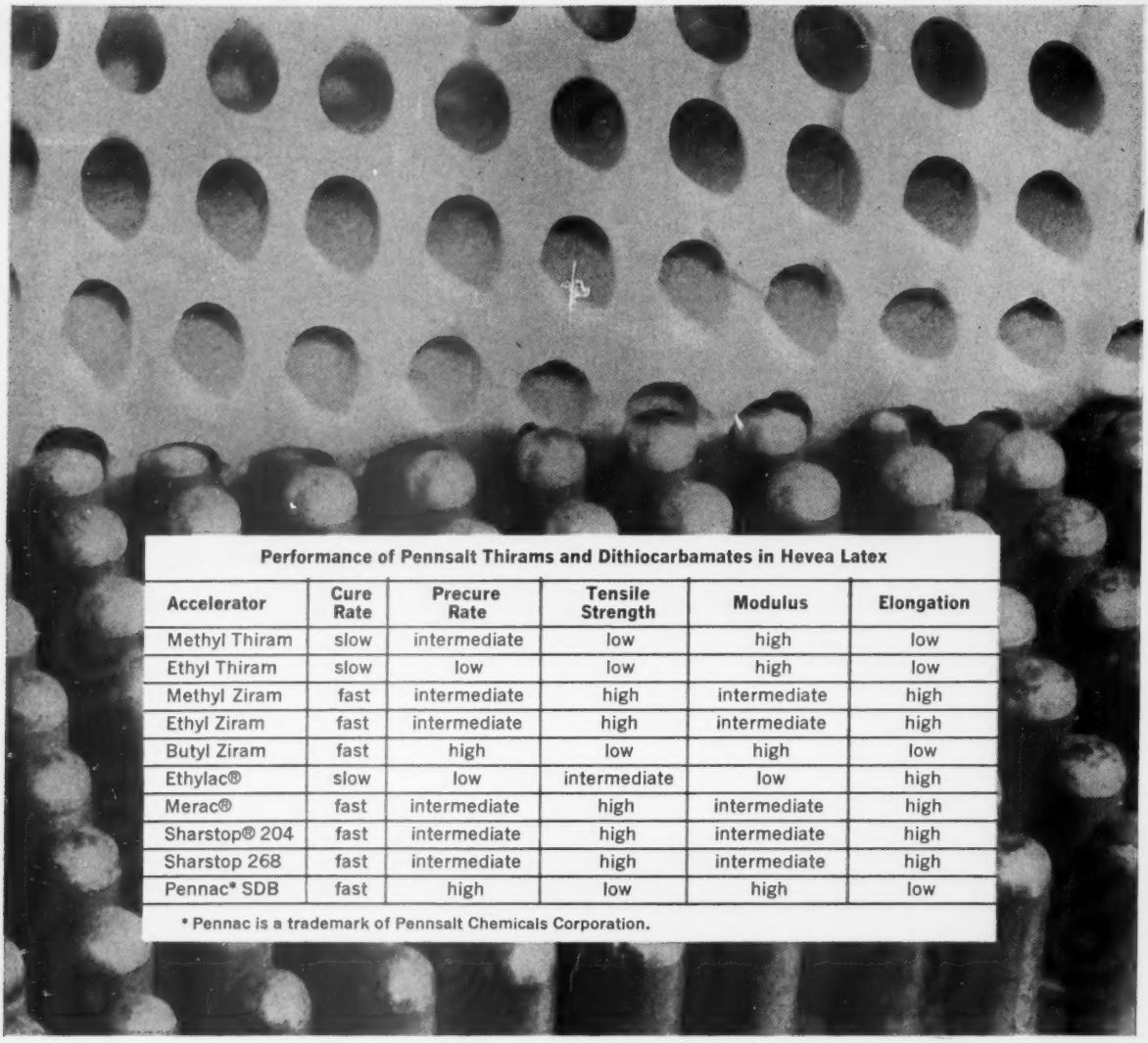
For further information and no charge samples of FLOSBRENE, see your ASRC representative.

ASRC
THE FIRST NAME IN SYNTHETIC RUBBER

AMERICAN SYNTHETIC RUBBER CORPORATION

EXECUTIVE OFFICES AND PLANT • LOUISVILLE 1, KENTUCKY General Sales Offices: 500 Fifth Avenue, New York 36, N. Y.

1139 Second National Bldg., Akron 8, O. 35 S. Dearborn St., Chicago 3, Ill. 1909 Riverbend Pkwy., Fremont, O.



Performance of Pennsalt Thirams and Dithiocarbamates in Hevea Latex

Accelerator	Cure Rate	Precure Rate	Tensile Strength	Modulus	Elongation
Methyl Thiram	slow	intermediate	low	high	low
Ethyl Thiram	slow	low	low	high	low
Methyl Ziram	fast	intermediate	high	intermediate	high
Ethyl Ziram	fast	intermediate	high	intermediate	high
Butyl Ziram	fast	high	low	high	low
Ethylac®	slow	low	intermediate	low	high
Merac®	fast	intermediate	high	intermediate	high
Sharstop® 204	fast	intermediate	high	intermediate	high
Sharstop 268	fast	intermediate	high	intermediate	high
Pennac* SDB	fast	high	low	high	low

* Pennac is a trademark of Pennsalt Chemicals Corporation.

For customized latex accelerator systems

PENNSALT THIRAMS and DITHIOCARBAMATES

Pennsalt's continuing evaluation of latex accelerator systems now provides you with data on the effects of a wide variety of thirams and dithiocarbamates in Hevea latex. Pinpointing these effects establishes a practical foundation for pre-selection of mixed accelerator systems that provide desired processing characteristics and product properties.

Qualitative comparisons of ten accelerators are shown here. Complete results of the study, including quantitative data on physical properties and aging characteristics, are now available in Bulletin S-170. For your copy, ask your Pennsalt representative or write Industrial Chemicals Division, PENNSALT CHEMICALS CORP., Three Penn Center, Phila. 2, Pa.

Pennsalt Chemicals
ESTABLISHED 1850

SEE OUR COMPLETE LISTING IN CHEMICAL MATERIALS CATALOG

INDUSTRIAL CHEMICALS DIVISION

SALES OFFICES: AKRON • ATLANTA • CHICAGO • DETROIT
NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS
H. M. ROYAL, INC., DOWNEY, CALIFORNIA

FOREIGN SALES: PENNSALT CHEMICALS OF CANADA LTD., OAKVILLE, ONTARIO
PENNSALT INTERNATIONAL, PHILADELPHIA, PA.
VONDELINGENPLAAT, ROTTERDAM, HOLLAND

all of a sudden . . .

Cabot black is.

- Inside these bags, t
- But everything else
- Each individual grad
  identifiable by color
  packaging means qu
  efficiency and greate
- Color-coded packagi
  Cabot customers, in
- Getting there first w
  For complete inform

....another Cabot first!

s, the same high quality carbon black Cabot has always provided.
se is new.
rade of Cabot black — SRF, HAF, MT or whatever — is now clearly
lor as well as by customer code when desired. Color-coded
s quicker and easier identification, increased plant and warehouse
eater cleanliness, economy and convenience all down the line. All at no increase in cost.
aging is being standardized, world-wide, for the benefit of all
, internationally. It's another first from Cabot.
t with new ideas for better carbon black and better service has been a Cabot habit since 1882.
rmation, write: Cabot Corporation, 125 High Street, Boston 10, Massachusetts, U.S.A.

colorful

CABOT CORPORATION

125 High Street, Boston 10, Massachusetts, U.S.A. LIberty 2-7300 Cable: CABLAK BOSTON

Sales representatives in all principal cities of the world

AKRON 8, OHIO — 518 Ohio Building — FRanklin 6-5168
CHICAGO 4, ILLINOIS — 141 West Jackson Boulevard — WEbster 9-6480
DALLAS, TEXAS — 1309 Main Street — RIverside 1-6117
LOS ANGELES 5, CALIFORNIA — 3350 Wilshire Boulevard — DUnkirk 2-7333
NEW BRUNSWICK, NEW JERSEY — 46 Bayard Street — KImer 5-1828
NEW YORK 17, NEW YORK — 60 East 42d Street — YUkon 6-7127

ARGENTINA — Cabot Argentina S.A.I.yC., Sarmiento 930-2° A, Buenos Aires
CANADA — Cabot Carbon of Canada, Ltd., 121 Richmond Street West, Toronto 1, Ontario
ENGLAND — Cabot Carbon Limited, 62 Brompton Road, London, S. W. 3
FRANCE — Cabot France S.A., 45, rue de Courcelles, Paris 8
ITALY — Cabot Italiana S.p.A., Via Larga 19, Milano
AUSTRALIA — Australian Carbon Black Pty. Limited, Millers Road, Altona, Victoria (jointly owned)

Printed in U.S.A. July, 1961

ROYLE STRAINERS MEAN RUBBER PROFITS

Royle 4A Strainer

As an example—Royle Strainers, with new, quick-opening heads, assure much longer production runs than ever before possible and considerably less down-time.

The large screen area gives more production time between screen changes; while the new breech-lock head, with automatic hydraulic-pneumatic operation allows for quick screen changes.

There are many other practical advantages built right in to Royle Extruders, for instance:

Heavy Duty Gear Case—with self-lubricating, opposed helical gears that were Royle designed and engineered specifically for strainer operations.

Powered Cut-Off Knife—with either rotary or up-and-down motion and adjustable cycling to give variable length products.

Longer L/D Ratios—allow mixing operations to be performed in the extruder. This gives a continuous and, hence, more economical mixing method than other operations.

Write today for complete Royle Strainer information. There is no obligation on your part.

ROYLE
Paterson, N. J.

JOHN ROYLE & SONS

Pioneered the Continuous Extrusion Process in 1880

Home Office, V. M. Hovey, J. W. VanRiper, SHerwood 2-8262. **Akron, Ohio,** J. C. Clinefelter Co., BLackstone 3-9222. **Downey, Cal.,** H. M. Royal, Inc., TOpaz 1-0371. **London, England,** James Day (Machinery) Ltd., Hyde Park 2430-0456. **Tokyo, Japan,** Okura Trading Company, Ltd., (56) 2130-2149.

John Royle & Sons, 4 Essex Street, Paterson 3, N. J.

Please, send me full information about Royle Strainers.

Name_____ **Title**_____

Company_____

Street_____

City_____ **Zone**_____ **State**_____

It was not until the mid 40's that the furnace process was able to create a carbon black capable of dethroning the old champ—channel black—and even then there was a fortuitous assist . . . the development of cold SBR. Like a pea waiting around for a pod, HAF was born to produce superior abrasion resistance in tread stock and industrial mechanical rubber goods. But it needed a rubber that could harness its abilities. Today, no carbon black is as versatile or has as broad a range of applications; and for quite a while the industry's top volume crown is to be made to the hat size of HAF.

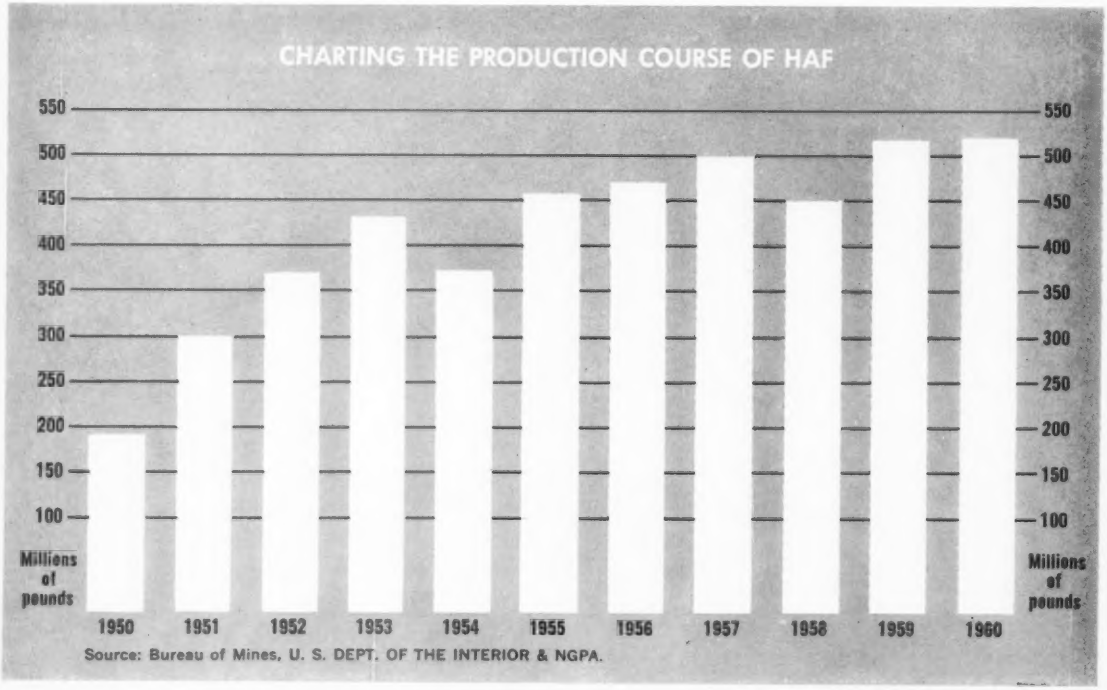
TRAVIS WHITSEL
Manager, Carbon Black Research
United Carbon Company

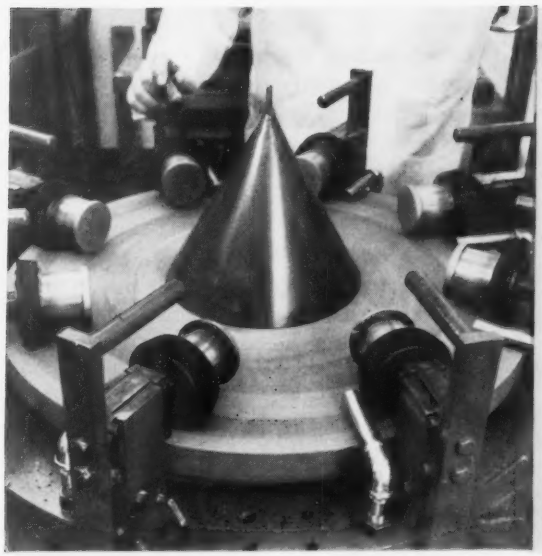
A Product in Perspective

HAF Carbon Black

The Second World War had ended. The carbon black and rubber industries, like the rest of American industry, were starting the gigantic job of returning to peace-time operations. During the war carbon black and rubber plants had done yeoman service in producing the vast quantities of conventional rubber and carbon black materials required to satisfy the immense demand of America's mechanized army for tires, tank treads and heavy duty rubber products.

Probably the most pressing need during this crisis was for an improved reinforcing carbon black produced more economically through the higher yield furnace black process. Thus the industry's research programs had been concentrating on the superior property balance available at that time only in channel blacks. The year 1945 saw the results of this research effort with the introduction of a high abrasion furnace black, HAF.





Goodyear Angle Abrader simulates abrasion similar to tire tread wear. Tests are run on 3½"-diameter specimens which are set at 11 degree angles ahead of center on a revolving grinding stone. Total volume loss is recorded after 32 minutes of revolutions at 85.4 rpm under a 32 lb. load.

Better Feedstocks and Improved Processing Control

HAF, or High Abrasion Furnace Black, is produced by the furnace process from highly aromatic oil feedstocks. The high concentration of aromatics in the oil is a key to higher reinforcing properties. Particulate configuration—"structure"—is directly relatable to the concentration of aromatics. Further, it can be stated that as the abrasion resistance of a black increases an even finer control of variables within a feedstock is required. As you ascend in abrasion resistance, the control of the carbon black manufacturing process becomes increasingly critical.

The highly aromatic oil feedstocks used today to produce HAF are almost as expensive as gasoline (before taxes, that is). Crude oil does not provide the necessary feedstock mix. Only a refined stock produced from a selected grade of crude oil and manufactured in specially designed petroleum cracking and reforming equipment will have the required degree of high concentration aromatics.

These refinery units are designed to produce antiknock gasolines, and the aromatic by-products used as HAF feedstocks are separated from the unit recycle streams.

Potentially Tremendous and Quite Temperamental

When the first HAF-natural rubber batches were mixed there was a gulping and grumbling reaction—and groans. The batches mixed hot, tubed hot, vulcanized prematurely, and gave other evidences of temperamental behavior—the old techniques did not get the job done. Once mixing and compounding techniques were mastered, a furnace black rubber compound was obtained which had better abrasion resistance and hence better roadwear than had been known before.

While new techniques tamed HAF and made it an acceptable mate in the marriage with natural rubber, it is doubtful that this furnace carbon black would have reached the top of the heap if it were not for the rubber industry's development of cold SBR.

Cold SBR seemed to have a steadying influence on a temperamental HAF. The opposite side of this compounding coin was cold SBR and channel black, but this combination was not the answer for general purpose use. This new high structure furnace black and the cold SBR combined to give a compound whose abrasion resistance was superior.

Let's examine some of the facets of this unique relationship to help clarify the picture a bit. There is a basic difference in molecular sizes to consider. The molecular weight of natural rubber is on the order of five times that of cold SBR. Milling natural rubber "breaks down" the molecules and tends toward uniformity in molecular size and weight. No similar action takes place in cold SBR to any marked extent; and, even after mixing, SBR remains an extremely non-homogeneous material as regards molecular dimensions. Thus, natural rubber has a built-in propensity for loss of "nerve" in contrast with the lack of such in cold SBR. As a consequence, natural rubber could accept any carbon black and end up in a com-

pound which could be processed. Cold SBR on the other hand needed a mechanism for losing "nerve" and the "structure" in HAF was provident.

With the advent of HAF carbon black a balance of particle size for reinforcement and structure for processing was achieved.

Significant Advantages

A review of the three significant reasons for using carbon black in rubber is in order. These are, we believe, the simplest parameters available to view a particular black in comparative terms. Briefly, they are as follows:

1. Reinforcement (wear and service life)
2. Filler (economy)
3. Processing Aid (mixing and fabrication)

As a general statement we can say that HAF carbon black has not been matched as a reinforcing agent with easy processibility and medium pricing. HAF was the industry's answer to the need for exceptional endurance at nominal cost. It is superior to channel black in roadwear and it imparts sufficient resistance to cut and crack growth, scuffing, impact, scraping, chipping, cutting and tearing.

One little known fact about HAF carbon black is its great advantage to the vast American traveling contingent. HAF helps to dissipate the static electricity generated on tires, improving car radio reception.

While SAF, Super Abrasion Furnace Black, can add as much as 25% longer wear to tires, and ISAF, Intermediate Super Abrasion Furnace Black, can increase tire mileage 10-15% over HAF, the higher raw material and manufacturing costs of these materials must give way to HAF when evaluating the economic balance of many applications. Today's costs of manufacturing the comparative channel black, EPC, or Easy Processing Channel, again established the economic balance in favor of HAF.

HAF does not have the outstanding processing ease of SRF or FEF but it can be classed as an easy processing black which offers smooth extrusions. HAF is extremely compatible with other furnace blacks as well as with the highly reinforcing channel blacks.

HAF is a major success today because it was developed to fill a big job—and because there was a parallel development in the rubber hydrocarbon field. These complementing developments are part and parcel of today's surging technological advances.

If you have a particular question relating to HAF or any other carbon black manufactured by United Carbon Company, please write to Dept. RA-7, United Carbon Company, Inc., 410 Park Avenue, New York 22, N. Y.

PROPERTIES OF HAF IN REVIEW

PROPERTIES*	UNITS	ISAF	HAF	FEF	EPC
Surface Area	Sq. M/Gm.	101.8	69.2	39.0	106.8
Particle Dia.	Mu	30.7	45.2	80.0	30.0
Volatile Matter	%	1.45	1.63	0.91	5.70
Ash	%	0.50	0.24	0.11	0.05
pH	—	9.1	9.2	9.3	4.3
Iodine Number	Mg./Gm.	125.0	76.1	47.0	75.0
Tint Comparison	—	385.0	366.0	308.0	364.0

*Property values are based on United Carbon and/or ASTM test procedures. Values given are typical.

UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.
A Subsidiary of United Carbon Company

AKRON CHICAGO LOS ANGELES
BOSTON HOUSTON MEMPHIS

In Canada: CANADIAN INDUSTRIES LIMITED
In France: UNITED CARBON FRANCE, S.A.

UNITED CARBON

As Ken Soule Sees It

by Kenneth J. Soule

Our National Pastime

In order to prevent any possible misunderstanding, when we use the above title we are referring to baseball. Traditionally, and probably in reality, this designation still seems correct, in spite of the competing claims of boating, skiing, fishing, loafing, griping, or what have you. At any rate, baseball is in the news on a couple of fronts—both being on the somewhat off-beat angle. The first involves the long-smoldering argument as to the relative speed of a regular baseball and a softball, each thrown by a top notch, professional pitcher. *This Week* magazine conducted scientific tests to determine the point, using a fifty-frame-a-second speed camera to clock two outstanding performers. These were Bill Massey, top pitcher of the world champion Clearwater, Fla., softball team, and Steve Barber of the Baltimore Orioles, who is on record as being the fastest hurler in the big leagues. The result—Barber's fastball traveled 95.55 miles per hour, while Massey's underhand offering zoomed along at an average speed of 98.8 mph.

That's what the machine said—if you don't believe it, demand a recount . . .

The second item involving baseball is of a more serious nature, potentially, at least. According to a news dispatch in the *New York Herald Tribune* by William G. Wing, white ash trees in the Northeast are seriously menaced by a fungus disease called ash die-back. Since about 95 per cent of the six million baseball bats turned out annually for use all over the world are made from the light, strong resilient wood of the white ash, the game of baseball quite possibly may soon have a major worry on its hands.

So far the bat manufacturers themselves do not seem to be upset about the matter, but Mr. Wing reports that this optimism is not shared by the foresters of the New York State Conservation Department. These gentlemen base their fears regarding the seriousness and spread of the disease on a survey just completed in 18 counties in New York State. *Sixty-four* per cent of the white ash trees in these areas were found to be dead or dying! The Conservation Department is said to feel that, when the remaining 44 counties are carefully inspected, the percentage of infected trees may be even greater . . .!

Although the disease was known to exist in New York as long ago as 1947, its effect was of minor consequence since it did not attack strong, single trees, nor those in dense forests. Now, however, no white ash tree seems immune. It is not known whether the villian in the piece—a minute fungus, called *Cytophoma priunosa*—is getting more virulent. Possibly environmental changes, such as a higher level of temperatures, or a consistently lower water table may have caused the marked increase in disease damage. In any case, unless a remedy is found in short order for this insidious killer, the white ash seems destined to follow the American chestnut into sad oblivion. Of course, as far as baseball bats are concerned, the rubber and plastics industries could no doubt turn out a suitable substitute—given a comprehensive spec to meet, and a little time to work on it. But even that wouldn't be quite the same as the close grained, springy, wood beauty we have felt, seen, and heard work its spine-tingling magic over these many years.

As Hiram Hosenpfeffer, "The Punkinville Poet," so touchingly(?) phrased it:

"The ping
Is the thing.
White ash
Makes the crash!"

Ultrasonics

Prior to the recent trouble which President Kennedy has been having with his back, the word ultrasonics (or ultra-sound) was, to most people, just another long-hair expression. Now that the President's physician is using "ultra-sound" treatments to alleviate the muscular pain in her No. 1 patient's back, it seems most likely that these terms will become stock phrases throughout the land.

Actually, of course, ultrasonics means sound raised to an extremely high pitch—mostly far above human hearing. Both it and ordinary household electricity start out as alternating current. But while the standard house current reverses at 60 cycles per second, ultrasonic equipment alternates at a rate of from 20,000 to 30 million times a second. These high-speed waves then have astounding capabilities.

Walter Ian Fischman, in a fascinating article in *Better Homes and Gardens* (March, 1961), explains how ultrasonic waves operate and describes some of the fabulous results obtained through their use. The first such practical application was in World War II sonar. Here the high pitched sound waves were dispatched in all directions through the water from destroyers or other Navy vessels to detect

enemy submarines. After the war, sonar was improved still further, and finally perfected until now, among other things, it can be used to chart the ocean depths—as well as to measure the dimensions of icebergs, vast ice fields, and the like.

Two early "consumer items" involving ultrasonics were the remote control gadget used to tune a TV set from across the room, and the "silent" whistle for calling your dog. From these unimpressive beginnings ultrasonics has now skyrocketed in all directions, and its possibilities truly seem almost without limit. Consider, if you will, a partial list of the wonders which its use has already brought about. To quote Mr. Fischman: "Today ultrasonics can ease the agony of arthritic pains, perform intricate surgery deep within the human brain, ripen cheese, make a better cup of coffee, drill complex holes in steel, weld metals without heat . . . dispel fog, and provide clean air (free of dirt and pollen) for home and industry."

The above list covers only a portion of the diverse examples cited in the article. Some are of particular interest to our industry and I shall hope to refer to them later. However, even this somewhat sketchy review may illustrate the vast potentials of ultrasonics and explain why the Russians consider it so important that "they claim to have invented the whole business themselves!"

Non-Tarnishing Silver

Are you annoyed by the nuisance of having to polish your sterling silver frequently? Or does the fact that such ware tarnishes so quickly keep you from buying more, or using what you own more often? If the answer to these queries is in the affirmative, we may have good news for you.

According to an item in Union Carbide's magazine *Chemical Progress*, its Silicones Division has developed a simple surface treatment for sterling silver which completely prevents tarnishing. Articles so treated over four years ago are said to have remained entirely free from tarnish, although used repeatedly, washed in automatic dishwashers, and subjected to salt, vinegar, coffee, and various foodstuffs which normally discolor silver.

The microscopically thin film produced by the treatment adheres so tenaciously to silver that there is some speculation a chemical bond may be formed. However, in spite of this excellent adhesion, the treatment is *not* recommended for flatware, such as knives, forks and spoons, because of the excessive amount of abrasive wear which they meet in normal service. But for silver hollow ware—vases, bowls, trays, candle sticks, and the like—it is the answer to the home keeper's dream. Such ware can now be handled like regular china, and stored unwrapped. Any errant fingerprints may be readily removed by wiping lightly with a soft cloth.

The material for the treatment is available to all silver manufacturers, with shipments being made from the Long Reach, West Va., plant of the Silicones Division. In applying the finish, low pressure sprays or dipping equipment are customarily used. The first company to offer hollow ware treated with U.C.C.'s new treatment was Fisher Silversmiths, Inc. They apply the name Siloxy finish to the silver so processed.

An interesting development of this non-tarnish spray, which is now in the nearly-completed stage, is an aerosol packaged variety. As soon as final tests are completed, it is planned to release these spray-it-yourself units to the general public. Then it will be possible for "Joe" to polish "Mabel's" tarnished hollow silver ware for the last time, spray it carefully, and in about fifteen minutes they can start using it just like china!

"Joe" can also quit worrying about any new golf cups, medals, or other bric-a-brac which he might have been hesitant about winning because of the extra shining up that they would soon require. Now, instead he can really concentrate on polishing up his short game and long putts, and let the trophies fall where they will. No more alibis . . .!

Cotton Comes Back

With so many new textile fibers having been developed over the past fifteen or twenty years, it is not surprising that many of the previous leaders have lost out to a greater or lesser degree. Cotton is one such natural fiber which suffered badly in competition with chemical or synthetic substitutes. Automobile tire markets, of course, represented the greatest single loss, but cotton replacement was also seriously felt in other fields, such as dress wear, laundry accessories, bags of various kinds etc. . . .

Now, however, it is pleasant to note that "Old Man Cotton" is making a strong and vigorous comeback. As reported in "Industrial and Engineering Chemistry," the 1959 consumption figure of approximately 8.6 million bales made it the best year since 1946. The totals for 1960 seem certain to be even higher, which will enable cotton to maintain new leadership, with "about ⅔ of the total U. S. mill consumption of textile fibers in over 400 end uses."

Much of this upsurge is due to the development and public acceptance of chemically treated cotton fabrics, especially the popular wash-and-wear types. Here, impregnation with special resins, or modification by reaction with specific chemicals, has worked wonders in the dress goods themselves. Wrinkle resistance—both wet and dry, improved crease recovery, water repellancy, durability (even against bleach solutions), and real easy-care are some of the features inherent in the new chemical cottons. In the course of this modern miracle, enormous quantities of a wide variety of special ingredients are required. These involve over 60 million pounds of resins used to impart wrinkle resistance, as well as millions of pounds of other chemicals to give cotton some of the special properties enumerated above.

So, in the struggle to maintain his own supremacy, "King Cotton" has made use of modern technology and scientific know-how. And in so doing, he has managed to be a real life-saver to a host of resins, bleaches, sizes, and other chemical agents as well. Long live the King!

Test tube on the left contains a mixture of polyvinyl acetate and hydrocarbon resin which have been hot melted together. They are obviously highly incompatible.

Test tube on the right contains the same incompatible mix, except that a quantity of Nevillac was added to the melt. They are now clearly compatible.

Nevillac® makes friends out of enemies in adhesive formulations

Among the merits of Nevillac, Neville Chemical Company's hydroxy resin, is its value as an essential ingredient in adhesive formulations. Because it is so highly compatible and soluble itself, it acts as an effective agent for bringing normally unfriendly materials together in solution. This co-compatibilizing and natural solubilizing characteristic is realized in its use with most elastomers, plasticizers, solvents and other resins. But these are not the only good reasons for using Nevillac.

Nevillac also possesses an inherent ability to increase the tack and bond of adhesives to which it has been added. It is effective in lowering the molten viscosity of adhesive formulations and it accentuates resistance to water and alkali.

Other Nevillac characteristics are generally good light stability, permanent thermoplasticity and ease of emulsification. It can be appropriately used in cold cut, hot melt or latex blended formulations. Write for further information.

Neville Chemical Company, Pittsburgh 25, Pa.

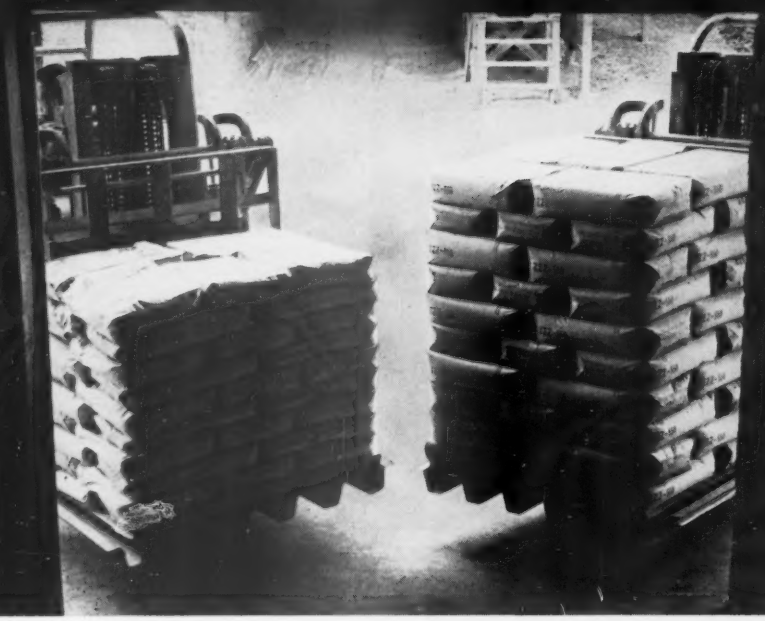
NEVILLE®

Neville Products

Resins—Coumarone-Indene, Hydrocarbon (Thermoplastic and Heat Reactive), Hydroxy • **Oils**—Plasticizing, Neutral, Rubber Reclaiming, Shingle Stain • **Solvents**—Aromatic (Refined and Crude), Semi-Aromatic (Refined and Crude). • **Antioxidants**—Non-Staining Rubber • **High Purity Indene • Indene Derivatives • Crude Naphthalene.**

Now you can greatly increase warehouse space at no increase in cost with...

AZODOX high apparent density zinc oxides



- Easier to Handle
- Stacks Higher, Safely
- Less Bag Breakage
- Close-Packed, Unitized Shipments

AZODOX stores in much less space than other zinc oxides. That's because you get many more pounds of AZODOX per cubic foot of pigment—up to 62 lbs. per cubic foot! Save valuable space for other purposes with every ton of AZODOX you buy.

In the manufacture of AZODOX, an exclusive process removes excess, space-wasting air from between individual particles of zinc oxide. Actual pigment density and every other desirable property remain unchanged. High apparent density AZODOX flows freely yet dusts less, incorporates fast and disperses thoroughly.

AZODOX is available in the following grades at no additional cost over conventional zinc oxides:

	Bulk Density lbs./cu. ft.	Rate of Activation	Reinforcement Properties
AZODOX-44 (Conventional)	60	Medium	High
AZODOX-55 (Conventional)	60	Fast	High
AZODOX-55-TT (Surface Treated)	62	Fast	High
AZODOX-550 (Conventional)	58	Medium	High

For technical data, fill in and mail this coupon.

AMERICAN ZINC SALES COMPANY
1515 Paul Brown Bldg., St. Louis 1, Mo.

Please send me technical information about...

☐ AZODOX-44 ☐ AZODOX-55-TT
☐ AZODOX-55 ☐ AZODOX-550
☐ 15 types of AZO brand zinc oxides

Name.....Title.....
Company.....
Address.....
City.....Zone....State.....

American Zinc sales company

Distributors for
AMERICAN ZINC, LEAD AND SMELTING COMPANY
Columbus, Ohio • Chicago • St. Louis • New York

PIONEERS.... (and not an Indian in sight)

We pioneered Stearex (pressed stearic acid) in the 1920's, using open minds instead of covered wagons. There weren't any Indians to shoot at us. But plenty of competitors who did. Despite it all, we kept pushing on with Stearic Acid in cake form — then bead form — and finally hydrogenated.

CENTURY HYDREX® 440

is the name of our present product. It's quality personified! Adds dependability and uniformity to rubber goods. Multiplies their shelf life. Extends their use life. Builds their reputation. Boosts their sales. What more can you ask? Detailed information? We'll be happy to supply it!

Write for samples or consult
CHEMICAL MATERIALS CATALOG
Pages 159-161 for data.

HARCHEM®
CENTURY BRAND

HARCHEM DIVISION

WALLACE & TIERNAN INC.
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY
PLANT IN DOVER, OHIO
IN CANADA: HARCHEM LIMITED, TORONTO

What's News in Rubber...

ENJAY BUTYL HT 10-66 gives this playground mat the ability to withstand years of scuffing and abrasion, repeated impacts and flexing, as well as outdoor weathering.

A NEW RUBBER TO DO THE HARD JOBS!

ENJAY BUTYL HT 10-66

Halogenated for...high heat resistance...covulcanization with other elastomers... low compression set... and faster cures

Plus these well-known Butyl advantages:

- *High flex, tear and abrasion resistance*
- *Low gas and moisture permeability*
- *Excellent chemical resistance*
- *High weather and ozone resistance*

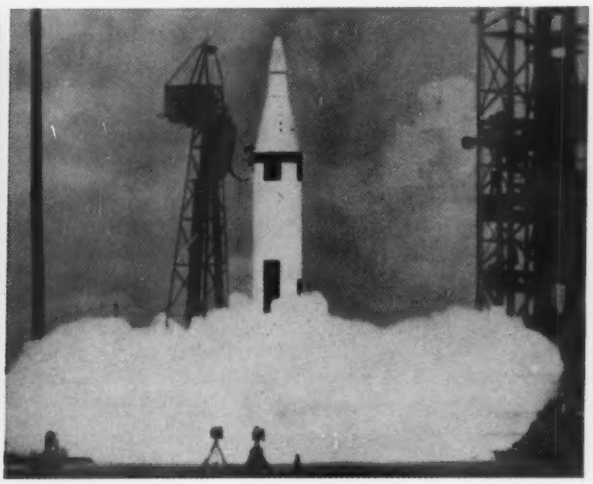
NOW AVAILABLE IN A VARIETY OF MOLECULAR WEIGHTS

AIR-HOLDING INNERLINERS of Enjay Butyl HT 10-66 help assure correct inflation pressure for tubeless tires and can give greater blowout protection as well as improved tire-tread wear. Other tire uses include white sidewalls, black sidewall veneers and chafer strips.

APPLIANCE PARTS of Enjay Butyl HT 10-66 withstand the deteriorating effects of detergents and dishwashing compounds. Absorption of hot water by the rubber is reduced to a minimum.

HOT MATERIAL BELTS like this perform well at continuous temperatures of 350°F, thanks to the exceptional heat aging properties of Enjay Butyl HT 10-66.

SHOCK-RESISTANT LAUNCHING PADS of metal-covered Enjay Butyl HT 10-66 withstand launching shock and exposure to intense heat encountered in missile firings.



WRITE TODAY FOR NEW TECHNICAL MANUAL HT 10-66...

Contains processing information, performance data and recommended cure systems. For your free copy or for technical assistance in applying this important new polymer, write to Enjay, 15 West 51st St., New York 19, N. Y.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

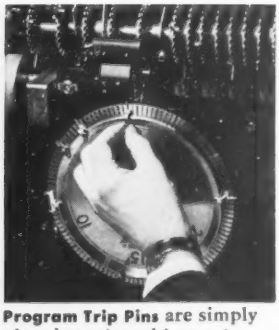
ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

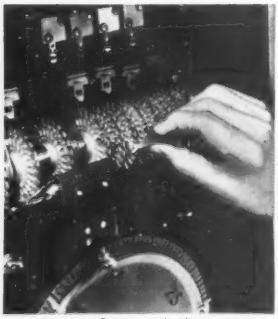
ENJAY® BUTYL

New Taylor **FLEX-O-TIMER**® *Timed-Program Controller...*

gives you—



Program Trip Pins are simply placed at selected intervals, set screws tightened with an Allen wrench.



Step Cams fit snugly into step disc notches, are easily bolted into place, never have to be adjusted.

- Up to 12 pneumatic and/or electric functions
- Faster, easier setting of Program Trip Pins
- Positive acting air valves with more than 3 times previous output capacity

Recognized for many years as a highly versatile "robot brain" for the precise timing and coordination of batch processes, this new FLEX-O-TIMER Controller has been made even more simple to operate, more precise in its control. It is ideal for providing completely automatic time control for tire presses, particularly for nylon cord tires requiring additional functions; platen presses; or any process requiring precise timing of process sequence and duration involving temperature, pressure, mechanical motion, electrical energy, or any combination thereof.

As well as the three major improvements listed above, the new FLEX-O-TIMER Controller incorporates these plus features:

- Extremely short time intervals between steps (with high accuracy) can be accommodated . . . 7½ seconds on 30 minute cycle dial; minimums on other dials in same ratio.
- Cycle range is quickly adjustable for 15 to 60 minutes for high-speed range. 1 to 16 hours for low-speed range.
- Time dial automatically resets to zero in maximum of 13 seconds at completion of cycle.

Ask your Taylor Field Engineer for full details, or write for **Bulletin 98373.** Taylor Instrument Companies, Rochester, New York, and Toronto, Ontario

Taylor Instruments MEAN ACCURACY FIRST

• **No Use Lying.** The April issue of *Plaste und Kautschuk*, the communist trade paper published in East Germany, carries an editorial dealing with the Spring Fair in Leipzig. It states that one of the main reasons for the ever-increasing attraction of Leipzig is the growing strength of the socialist camp, which manifests itself anew at every fair in Leipzig. The annual average rate of growth of industrial production in Soviet Russia, for instance, amounted to 11.9 per cent from 1951 to 1959 (three times as much as in the United States); in Poland, 13.1 per cent; in Czechoslovakia, 10.9 per cent; and in the East German Republic, 11.7 per cent.

On the other hand, the editorial continues, the capitalist countries are perturbed by the ups and downs of the national economy, and ever-recurring crises; the number of unemployed in the United States, still the most powerful industrial country in the world, has risen to more than 5.5 million people. Industry in many capitalist countries is not working at full capacity, and the dollar has been devaluated in order to stem the continuous loss of the United States' share of the capitalist world trade.

Well, the editors will have to eat their own words, because the dollar has not been devaluated. On the contrary, the value has risen in the meantime; it is a well-known fact that recently our gold reserves have increased. The inflated growth rates of the various communist countries are not fooling anybody. We know very well that even Russia started at a very low level, concentrated on the build-up of heavy industry, neglected the needs of the civilian population, and thus was able to show for a few years a larger rate of growth than the United States. This was achieved, however, with the help of a controlled economy, whereas we had a respectable national growth rate without suppressing the requirements of the civilian population.

Lately, the communist publication has tried to broaden its international horizon by devoting more and more space to the development in the "capitalist countries", such as reporting many international conferences and devoting considerable space to capitalist accomplishments. Even in the editorial dealing with the Leipzig Fair, they talk much more about the progress in West German chemical factories than about their own. However, all these developments will be for naught if the editors continue to print outright lies. In order to achieve equality with the Western trade press, one must stick to the truth.

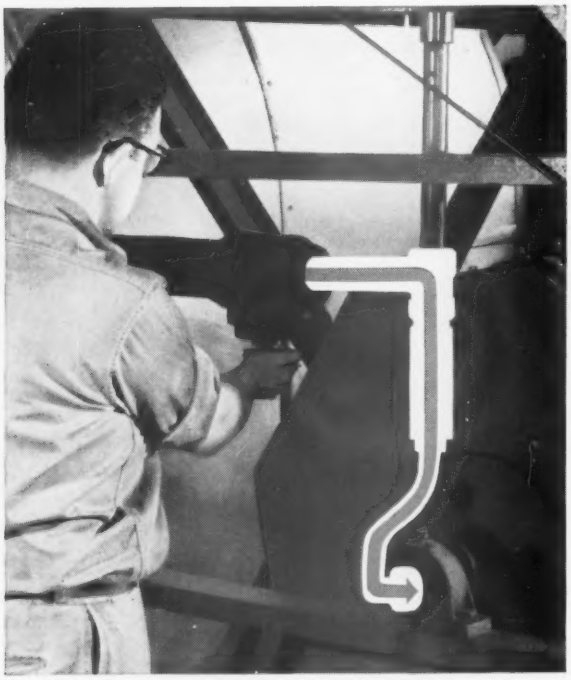
• **Semperit AG Listed on Frankfurt Exchange.** The shares of this leading Austrian rubber company, Semperit Oesterreichisch-Amerikanische Gummiwerke AG Wien (Semperit Austrian-American Rubber Works Co., Vienna), have been admitted for listing on the Frankfurt Stock Exchange. For 1959, Semperit AG reported sales amounting to $53,600,000. Last year, production was increased by 12 per cent. Main products manufactured are automobile tires, rubber shoes, rubber soles, technical rubber goods and related products. A large section of the factory is devoted to the production of plastics. In view of the prevailing boom in Austria, Semperit AG has been working at full capacity. Last year, more than $4,000,000 were invested in new machinery and equipment.

• **New Tire Factory in Turkey.** A new factory will go on stream in Turkey during the summer of 1962. Quite a number of leading foreign daily newspapers report that one of the largest rubber companies in the United States, the U. S. Rubber Co., New York, N. Y., with factories and branches in more than 130 countries and more than 80,000 employees, is building a tire and tube factory near Izmir, Turkey. The new unit will have an annual capacity of 250,000 tires. According to an agreement with the Turkish Government, this factory will produce tires for trucks and tractors and will supply about 25 per cent of the Turkish requirements. The most important European partners of the American company are the Engelbert Tire Works in Germany, Belgium and France.

• **New Tire Factories Overseas.** In recent weeks, the international press has carried many news items dealing with new tire factories. In Jog-Jakarta, Indonesia, a factory for the production of bicycle tires will be constructed. Machinery and equipment amounting to about 3½ million dollars have ostensibly been ordered in West Germany. A local building concern will erect the factory and other facilities. Goodyear Tire and Rubber Co. and the United States Rubber Co. will build a tire factory in Turkey, having an annual capacity of 400,000 tires and 300,000 tubes. The Turkish government will hold a 40 per cent interest in the new endeavor. The factory is scheduled to go on stream within two years.

THE PURECO CO_2 COLD BLUE LINE

means better, faster, more economical deflashing



SAVE WITH PURECO CO_2 "FLASH CHILLING"

Pureco engineers daily improve the efficiency and economy of CO_2 deflashing operations. Configuration of parts, type and number of baffles, weight of charge, temperatures, tumbling additives, speed, length of tumbling cycle . . . all these variables affecting tumbling operations have been studied and operations improved in many cases. Pureco can help you benefit from an efficient tumbling operation with Pureco CO_2 *Flash Chilling*.

Pureco *Flash Chilling* using either CO_2 Liquid or solid (DRY-ICE) as the refrigerant, when properly handled, provides the most satisfactory and economical means of production deflashing.

Pureco Technical Sales at your service

Whatever your deflashing problems, Pureco Technical Sales Service will be happy to survey your operation, run demonstration tests and make recommendations with no cost on your part. Call your local Pureco representative or write:

PURECO CO_2

PURE CARBONIC

Pure Carbonic Company, A Division of Air Reduction Company, Inc.
General Offices: 150 East 42nd Street, New York 17, N.Y.

Overseas

India—Mansfield Tire & Rubber Co., Mansfield, Ohio, has completed negotiations for the acquisition of approximately 20 per cent of the capital stock of Madras Rubber Factory, Ltd., India's largest producer of tread rubber. The Indian firm is entering the tire manufacturing field and will erect a new tire manufacturing facility in Madras, with an annual capacity of 300,000 tires, 300,000 tubes, and one million pounds of tread rubber.

Russia—The *Economic Gazette* reports that a new synthetic rubber facility is being built at Stravropol, near Kuibyshev, in the central Volga area. The new enterprise is part of the petrochemical industry based on the Kuibyshev oil field. The plant will be fully automated, with equipment being supplied not only by the Soviet Union but also by East German and Czechoslovakian firms.

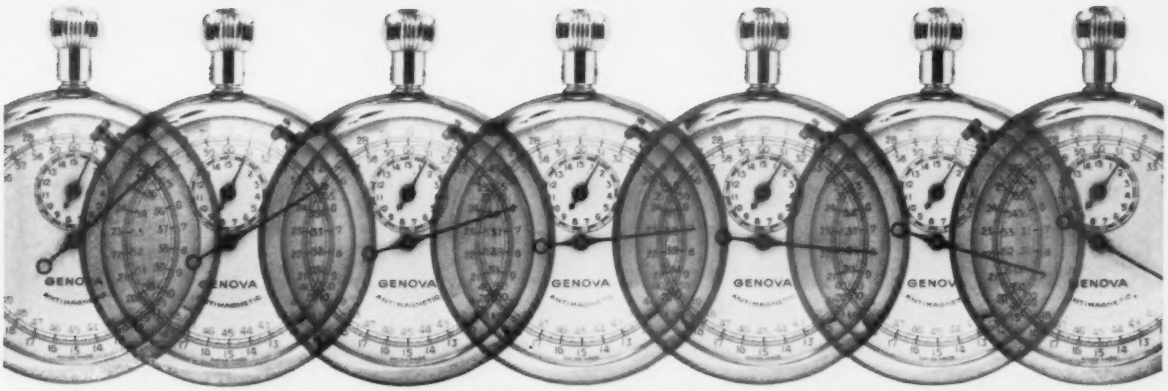
France — Etablissements Kalker, a French manufacturer of pipes, joints, sheets and straps, conveyor belts, vat linings and other rubber industrial goods, is seeking licensing rights for American technical or industrial products made of rubber or asbestos. Interested firms may contact Ets. Kalker, 58 rue de Paris, Les Lilas (Seine), France.

Malaya—Dunlop Rubber Co. Ltd. will build a $25,000,000 tire plant in Patalang Jaya with an annual capacity of 400,000 tires. A large proportion of this output will supply Malaya and India, and the remainder will be available for export. It is reported that some of the capital will be provided by investors in the Federation of Malaya.

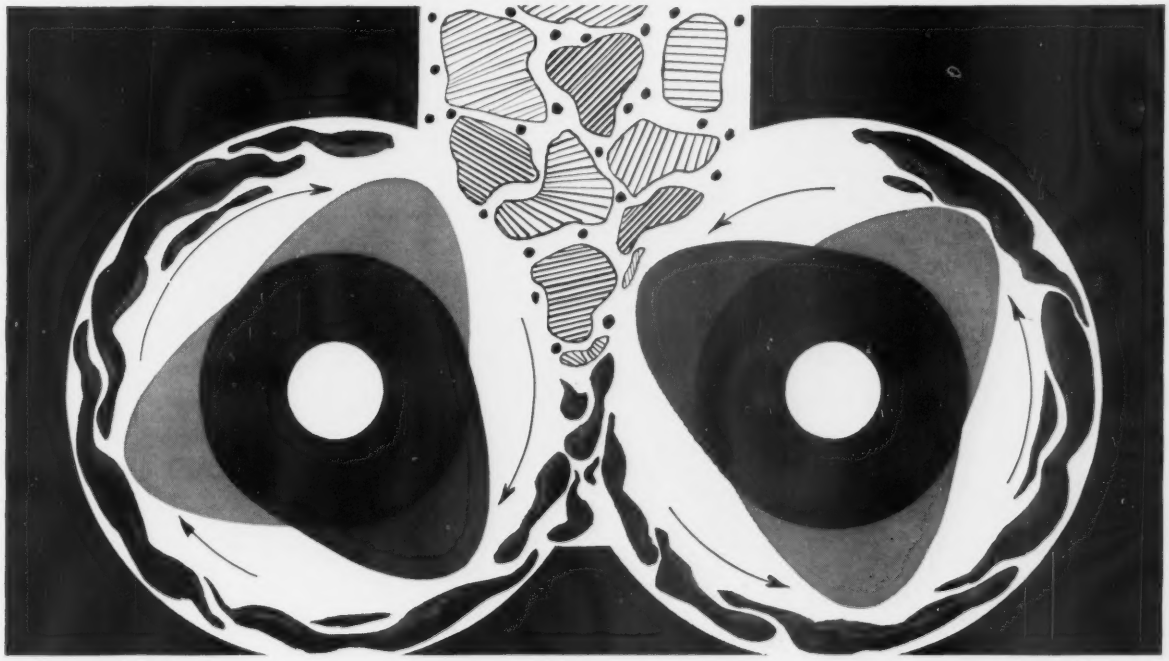
Japan—According to Japanese customs statistics for the first 11 months of 1960, United States synthetic rubber exports to Japan increased 25.2 per cent from the same period in 1959. Value of these exports was $24,602,000 from January through October, 1960, compared with $19,649,000 for the same 1959 period.

England—A synthetic latex factory, located on a 60-acre site at Stallingborough on the Humber Bank, near Grimsby, will be constructed by Revertex, Ltd. The facility will be run by a jointly-owned company to be formed by Revertex and the International Latex Corp., Dover, Delaware.

Turkey—Construction of a new Pirelli tire factory, located near Istanbul, has begun. Initial output of the $2,500,000 plant will be 120,000 tires and inner tubes. This will be increased later on to a capacity of 250,000 units.



problem: cut costs by speeding up the mix!



solution:

FIRESTONE TECHNICAL SERVICE and DIENE

An automotive industry supplier encountered mixing problems in a sealant compound—a type used between lapped metal strips. Slow processing was hiking costs.

Firestone Technical Service recommended the use of *Diene** rubber, Firestone's dramatic new achievement in polymer chemistry. The result? With Diene in the mix, processing time and costs were cut substantially, allowing more efficient use of equipment.

Any other advantages provided by Diene? Lots of them. Excellent low temperature properties, vibration and noise dampening, greater resiliency.

Firestone chemists have found that when Diene is blended with natural or synthetic rubber, the resulting compound gains remarkable qualities that expand and excel the best features of both, including far greater resistance to wear, heat, cracking and aging.

If you have a problem that may concern synthetic rubber, take advantage of the technical services offered by Firestone, the world's largest and most experienced manufacturer of high-quality synthetic rubbers and latices. Just call your Firestone Technical Service representative or write Dept. 23-4 for information.

Firestone's Diene rubber plant is in full commercial production.

Firestone

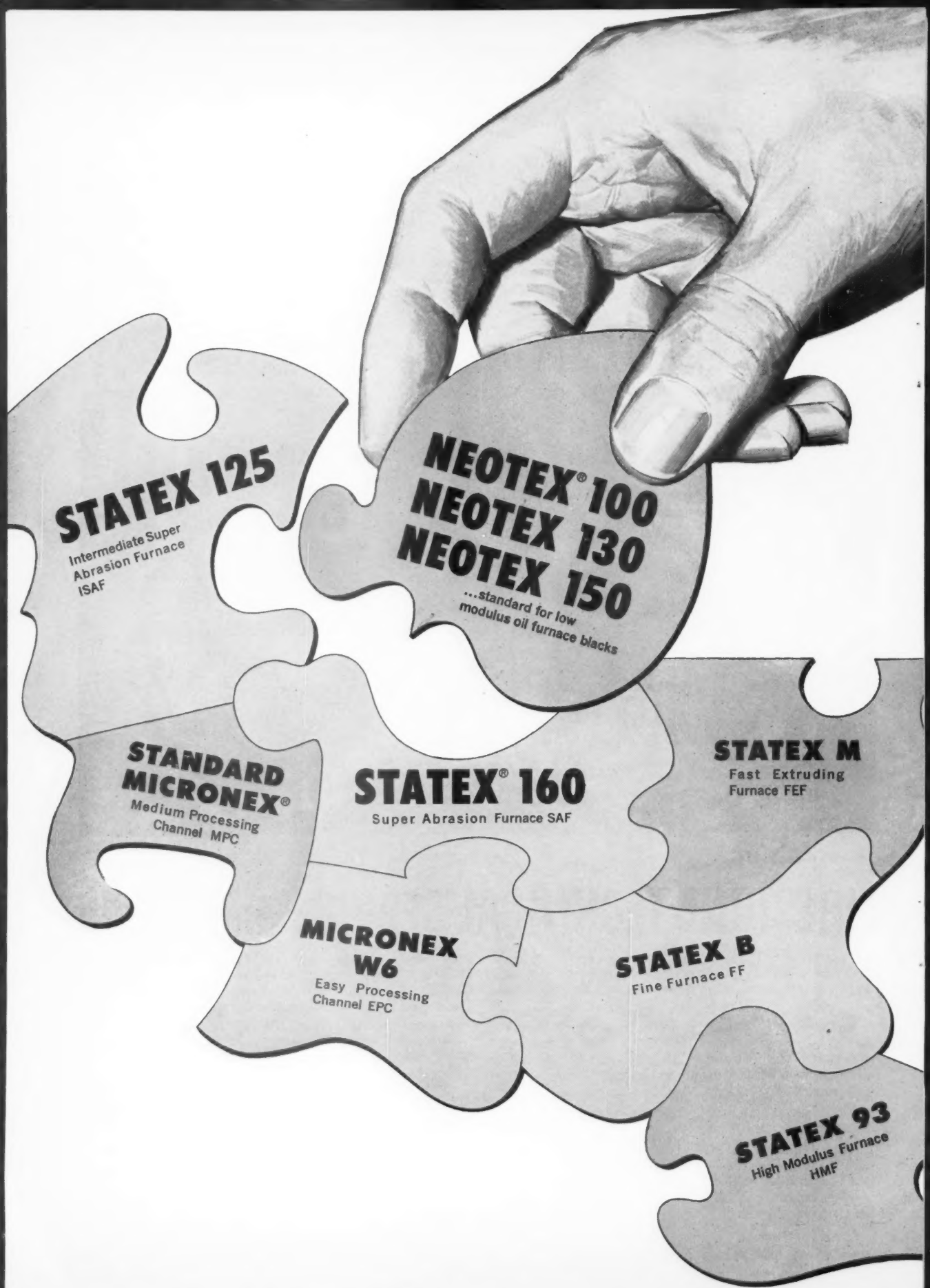
SYNTHETIC RUBBER & LATEX CO.

AKRON 1, OHIO

MAKING THE BEST TODAY STILL BETTER TOMORROW

Copyright 1961, The Firestone Tire & Rubber Company

*A Firestone trademark for synthetic rubber


STATEX 125
Intermediate Super Abrasion Furnace ISAF
NEOTEX® 100
NEOTEX 130
NEOTEX 150
...standard for low modulus oil furnace blacks
STANDARD MICRONEX®
Medium Processing Channel MPC
STATEX® 160
Super Abrasion Furnace SAF
STATEX M
Fast Extruding Furnace FEF
MICRONEX W6
Easy Processing Channel EPC
STATEX B
Fine Furnace FF
STATEX 93
High Modulus Furnace HMF

COLUMBIAN has a carbon black to fit your every rubber need!

From the outstanding blacks of the STATEX range to the new NEOTEX blacks — those oil furnace carbon blacks that provide a softer ride, less noise, good wear — Columbian has a carbon black for every use. Contact your Columbian representative . . . and send off the coupon for complete information, today.

COLUMBIAN CARBON COMPANY
380 Madison Avenue, New York 17, N. Y.
Branch offices and agents in principal cities

A-1
COLUMBIAN CARBON COMPANY
380 Madison Ave., New York 17, N.Y.
Tell me more
about Columbian carbon blacks for rubber!
Name.....
Position.....
Firm.....
Address.....
City.....Zone.....State.....

RUBBER TRENDS

by The Economist Intelligence Unit, Ltd.

RUBBER TRENDS is a quarterly bulletin for all those concerned with rubber, whether as a manufacturer, dealer or producer. The bulletin provides regular analysis of the main factors affecting the supply and consumption of both natural and synthetic rubber. It does not duplicate information already available elsewhere; the emphasis throughout is on long term studies of rubber trends.

RUBBER TRENDS is prepared and edited in London by *The Economist Intelligence Unit, Ltd.* Analysis and research in London are supplemented by reports from expert correspondents in the world's key consuming and producing areas. Associated with the famed London "Economist" the EIU is the largest international business and industrial research firm of its size and reputation serving major world markets.

RUBBER TRENDS appears four times a year and is available at the annual subscription fee of $90, which includes airmail postage. Additional subscriptions (within the same company) are $15, also including airmail postage.

Each issue reports on

- The World Balance
- Trends in Consuming Countries
- Market Reports
- General Notes
- Statistics
- Plus Two Special Features

Special features in recent issues covered:

- Russian production and consumption
- Prospects for UK consumption
- Prospects for consumption in France
- Rubber industry in Ceylon
- Trend in West German consumption
- Indonesian rubber industry

Some of these reports have already been acknowledged by authorities as the most complete and authentic yet to appear. Special attention is paid to the synthetic rubber field.

send this coupon today

Palmerton Publishing Co., Inc.
101 West 31st Street
New York 1, N. Y.

Date .....

☐ Please enter our subscription to RUBBER TRENDS as follows:

☐ One subscription at $90

☐ ..... additional subscriptions at $15 each.

☐ Please send a sample copy of RUBBER TRENDS.

Name ..... Title .....

Company .....

Street .....

City ..... Zone ..... State .....

WHY POLYSULFIDE CRUDES ARE PICKED FOR THE BIG JOB

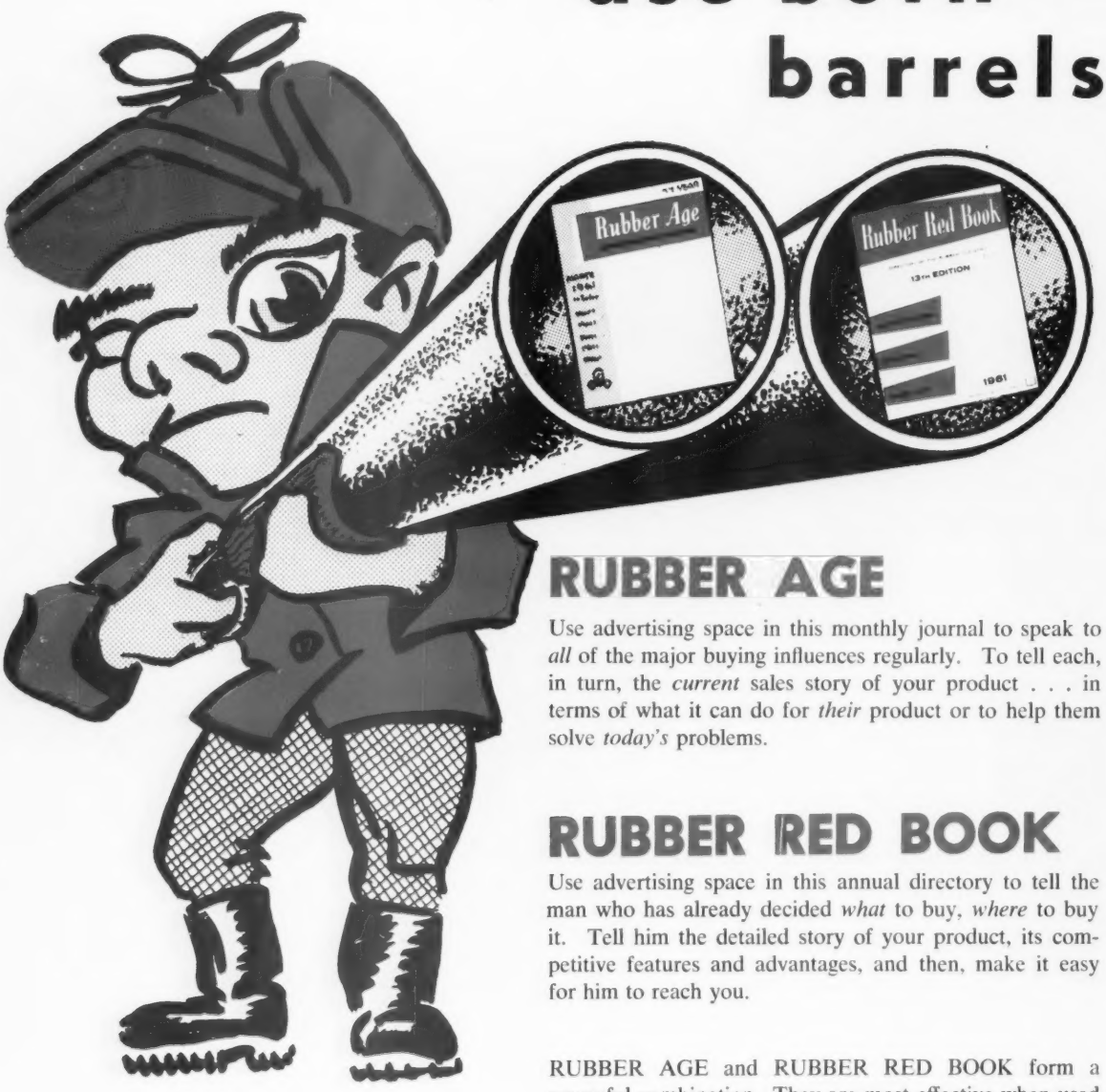
IMPERMEABILITY TO GASES

Manufacturers of synthetic diaphragms for gas meters and regulators are producing the most reliable measuring components ever from sheets of THIOKOL polysulfide crude rubber or from fabric coated with it. Reeves-Vulcan, a top producer in the field, finds that the use of polysulfide crudes results in maximum meter efficiency—greater accuracy, longer life, lower maintenance costs. Unlike leather or other materials, THIOKOL polysulfide crudes maintain full integrity though constantly exposed to degrading gases, sunlight, ozone, vapors and to wear of diaphragmatic action. They resist solvents of all kinds, remain flexible at low temperatures (to -65 deg. F.), and assure long trouble-free service. For comprehensive technical literature, write Thiokol or use the coupon.

Thiokol®
CHEMICAL CORPORATION
780 N. Clinton Ave., Trenton 7, N. J.
In Canada: Naugatuck Chemicals Division, Dominion Rubber Company, Elmira, Ontario
Gentlemen: Please send further information about following properties of polysulfide crudes ☐ Impermeability to gases ☐ High solvent resistance ☐ Low temperature flexibility

Name_____
Firm_____
Street_____
City_____ Zone____ State_____

use both barrels



RUBBER AGE

Use advertising space in this monthly journal to speak to *all* of the major buying influences regularly. To tell each, in turn, the *current* sales story of your product . . . in terms of what it can do for *their* product or to help them solve *today's* problems.

RUBBER RED BOOK

Use advertising space in this annual directory to tell the man who has already decided *what* to buy, *where* to buy it. Tell him the detailed story of your product, its competitive features and advantages, and then, make it easy for him to reach you.

RUBBER AGE and RUBBER RED BOOK form a powerful combination. They are most effective when used to supplement the effort of your sales staff because they carry your story to influential people your salesmen never get to see . . . and may not even know.

Write today for information on the important buying influences in the rubber industry and learn what kind of advertising appeals to them. Ask for a copy of the booklet, "How to advertise effectively to the rubber industry."

published by

PALMERTON PUBLISHING COMPANY, INC.

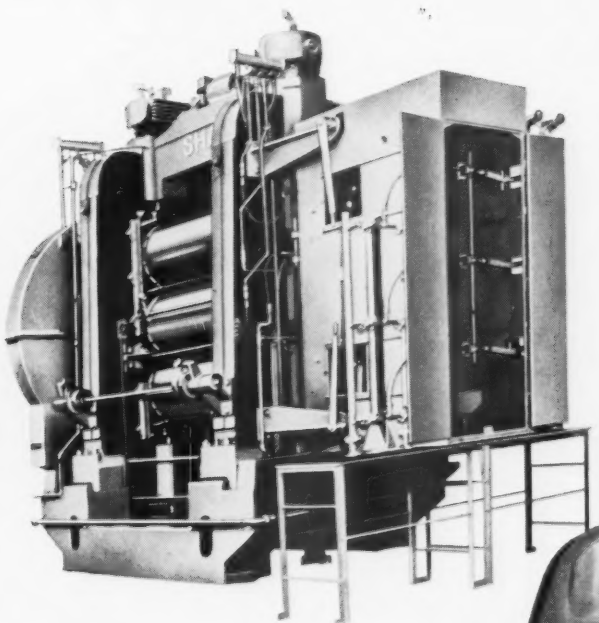
Publishers of ADHESIVES AGE • RUBBER AGE • RUBBER RED BOOK

101 West 31st Street, New York 1, N. Y. PE 6-6872

behind every

Francis Shaw machine

research · design · quality engineering



A507

A Francis Shaw three-roll calender – 72 x 28 inches – with Shaw standard features

- All types of roll configuration
- Full supporting auxiliaries
- Rolls of drilled or bored construction
- Adjustable camber control
- Full flood lubrication
- Designs for all rubber and plastic applications

Constant research and development, close co-operation with users, advanced design, selected high quality materials . . . These, coupled with long experience, help to create processing machinery of unrivalled performance.

Francis Shaw

FRANCIS SHAW & COMPANY LIMITED · MANCHESTER 11 · ENGLAND

TELEGRAMS: "CALENDER" MANCHESTER · TELEPHONE: EAST 1313-8 · TELEX: 66-357

London Office: 22 Great Smith Street London SW1 · Telephone: Abbey 3245 · Telegrams: Vibrate London · Telex: 22250

Canada: Francis Shaw (Canada) Ltd Grahams Lane Burlington Ontario · Telephone: Nelson 4-2350 · Telegrams: Calender Burlington Ontario

Telex: Canada Calender Hamilton 021/662

OVERSEAS AGENTS THROUGHOUT THE WORLD

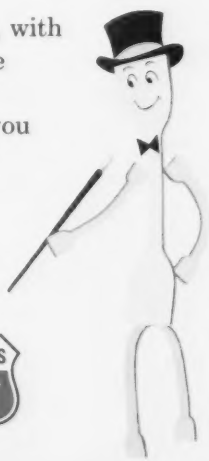
P4393

For economical processing always specify Philprene*

Masterbatches for tread rubber

Easy-processing Philprene Masterbatches give you fast, trouble-free extrusions . . . reduce processing time . . . help keep your whole operation moving along smoothly (and profitably). In addition, tread rubber made from Philprene is exceptionally tough and durable, with good flex life, excellent resistance to abrasion and aging. A wide choice of Philprene rubber lets you select the polymer that is best suited to your purpose.

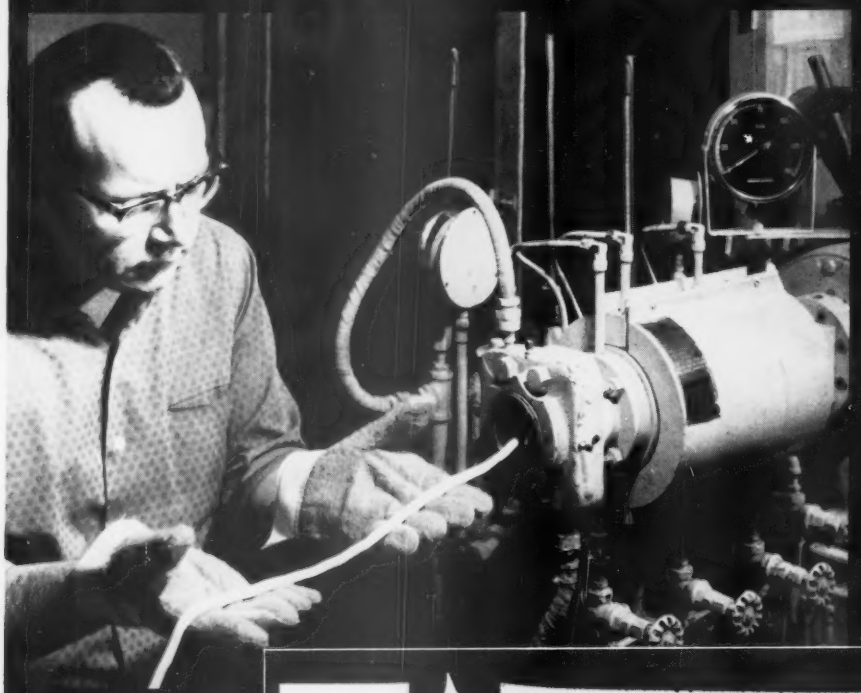
*A trademark



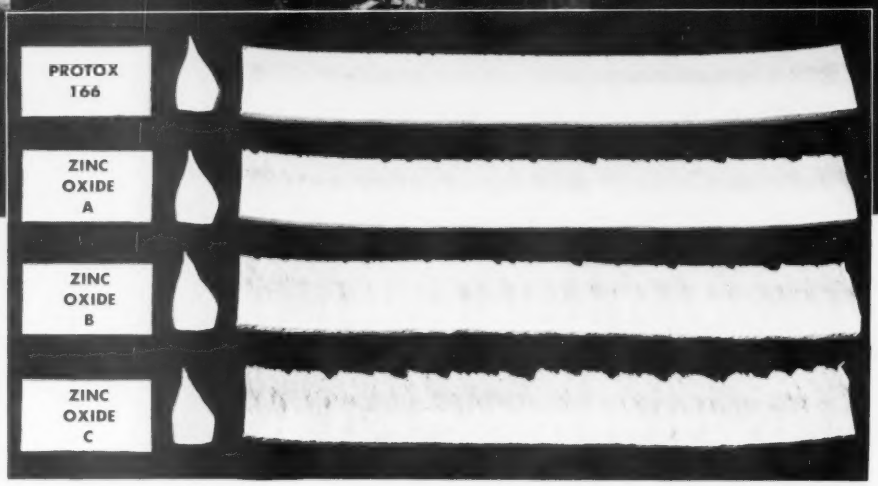
Philprene PHILLIPS 66

PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Sales Division, 318 Water St., Akron 8, Ohio; **Sales Offices**: Akron, Chicago, Dallas, Providence and Trenton; **West Coast**: Harwick Standard Chemical Company, Los Angeles, California; **Export Sales**: Phillips Petroleum International Corporation, Sumatrastrasse 27, Zurich 6, Switzerland; Distributors of Phillips Chemical Company Products, 80 Broadway, N. Y. 5, N. Y.

Reduce Die Swell and Provide Smoother Surface of Extruded Stocks with... PROTOX® Zinc Oxides



The excellent extrusion properties of PROTOX-166 at 100 parts volume loading in natural rubber are shown below in comparison with conventional zinc oxides.



HORSE HEAD PRODUCTS ®

The same desirable characteristics of Protox zinc oxides that provide lower shrinkage and smoothness in calendering also impart superior properties to extruded rubber stocks.

Protox zinc oxides are outstanding in dispersion and freedom from aggregates and provide a unique plasticizing action. That's why they will enable you to reduce die swell and get smoother surface of your extruded stocks. And because they disperse readily in the mixing operation, they will help you to extend your running time before cleaning strainers.

May we show you how you can increase production efficiency of your extruded stocks with PROTOX zinc oxides?

THE NEW JERSEY ZINC COMPANY

160 Front Street, New York 38, N. Y.

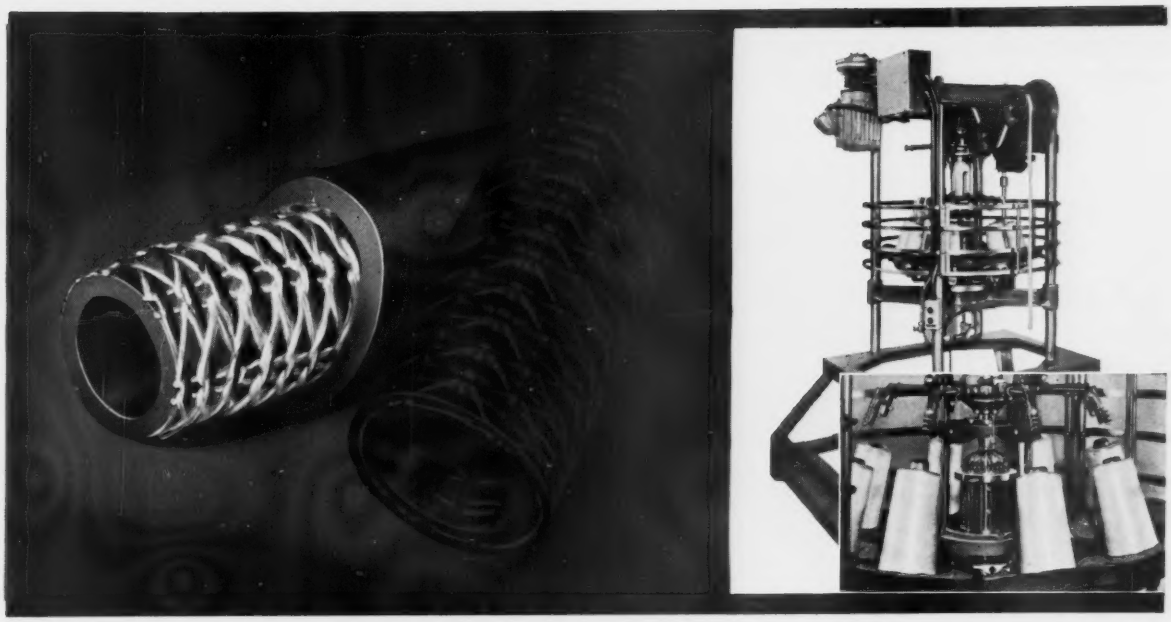
Founded 1848

Also Distributed by

VAN WATERS AND ROGERS SEATTLE · PORTLAND (ORE.) · SPOKANE · VANCOUVER, B.C. · DALLAS · HOUSTON

ST. LAWRENCE CHEMICAL COMPANY, LTD. TORONTO, ONT. · MONTREAL, QUE.

ATLANTA · BOSTON
CHICAGO · CLEVELAND
LOS ANGELES



New FIDELITY WRAP-KNIT
Saves Time, Saves Money, Adds Strength

You get these advantages only with the new Fidelity wrap-knit method of hose reinforcement. Use the Fidelity Hose Reinforcement Knitter with *all* natural or synthetic yarns . . . on rubber *or* plastic hose extrusions . . . with ID's from 1/8" to 2 3/8". Load 64 lbs. of yarn *at one time* . . . complete up to a full day's production without *reloading.*

No other method of reinforcement offers the circumferential strength, resistance to swell and kinking — and *production economy* — as Fidelity Wrap-Knit. Write for details today . . . or come see a Fidelity in action!

YARN SAVINGS TO 35%

MAXIMUM BURST PROTECTION

SPEEDS TO 1,000 FEET/HOUR

REQUIRES MINIMUM FLOOR SPACE

SINGER-FIDELITY, INC.

A subsidiary of THE SINGER MANUFACTURING CO.

3908 FRANKFORD AVENUE, PHILADELPHIA 24, PENNSYLVANIA, U.S.A.

EXPORT AGENT: 11 Broadway, New York 4, New York • Cable Address: FIMACO

Canadian Representative: W. J. Westaway Co., Ltd., Hamilton, Ontario Canada / West Coast Representative: H. M. Royal Co., 11911 Woodruff Ave., Downey, Calif.

Memo to Suppliers . . .

Will you be there when buyers need you most?

You will if you advertise in the

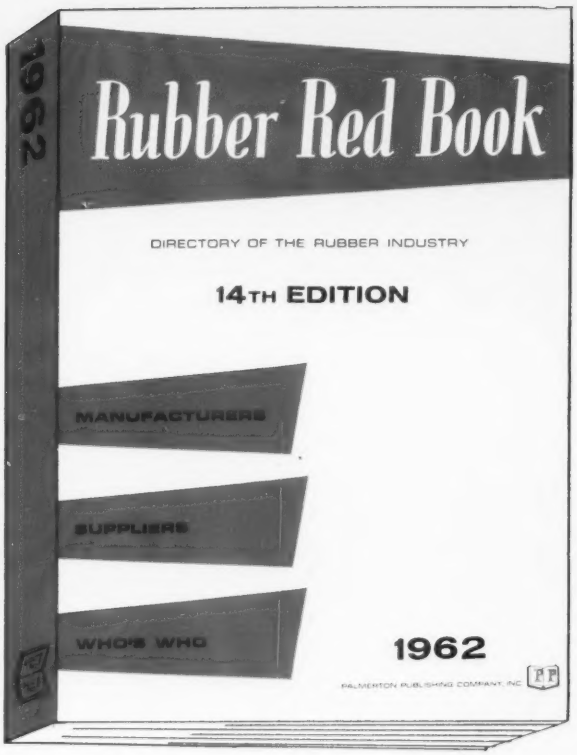
1962 RUBBER RED BOOK

Your advertisement in RUBBER RED BOOK gives your company representation when buying decisions are being made. It's like having your salesman there just at the right moment. You are there when buyers need you most because your ad speaks for you.

It tells some strong points about your product . . . lists competitive advantages . . . cites practical reasons why your company should be selected. Then, your ad makes it easy for buyers to reach you. It can list phone numbers of your home office or local agents, or show warehousing points for swift action.

Your ad may be the deciding factor in getting an order . . . or landing a new account . . . or keeping an old one!

Buyers in every rubber goods plant in the United States and Canada will see your ad. They'll see it in the most used reference book in our field. And your ad will last for a full year. That's why practically all of the important suppliers use space in this Directory, some using up to 20 pages to get their story across.



Make certain that your ad is speaking for you every day in every rubber plant. Reserve your advertising space now. Use the handy coupon herewith or your own purchase order. But, do it now.

Publication Date: October, 1961 — **Advertising Closing Date: August 31, 1961**

Published by RUBBER AGE — **101 West 31st Street • New York 1, New York**

RUBBER RED BOOK
101 West 31st Street,
New York 1, N. Y.

Please reserve the following space for us in the 1962 edition:

.....

We agree to pay for this at the rates shown in your rate card.

Company .....

Address .....

Signed By ..... **Title** .....

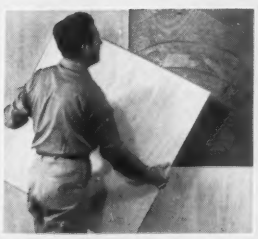
Condensed Schedule of Rates for the 1962 issue

(Note: Lower rates apply when two or more units are used).

Page	**$225**
2/3 page	**175**
1/2 page (island)	**150**
1/2 page (horiz.)	**125**
1/3 page	**95**
1/6 page	**56**

Better... from VELSICOL

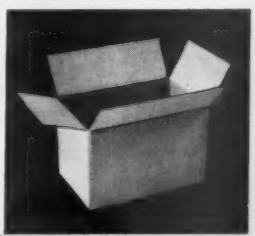
Adhesive recipes containing Velsicol's hydrocarbon resins are TOPS FOR TACK



WALL & FLOOR TILE
Mastics for floor and wall tile or sheets, bond better with Velsicol resins in the mix.

LOW OXYGEN SUSCEPTIBILITY OF VELSICOL HYDROCARBON RESINS KEEPS ADHESIVE PRODUCTS TACKY!

Velsicol hydrocarbon resins in combination with synthetic elastomers improve adhesives by providing excellent initial grab and longer lasting tackiness. Oxygen take-up is lower so aging and drying is retarded appreciably. The result is adhesive products with longer life at lower cost. PROVIDES *BETTER* BONDING—*BETTER* CHEMICAL AND WATER RESISTANCE!



PAPER
Velsicol hydrocarbons combined with Neoprene make excellent adhesive for Kraft to Kraft bonding.

TAPE
Plastic and cellophane tapes have longer life and tack retention when Velsicol resins are used in Styrene Butadiene recipes.

LEATHER
Shoe last cement for manufacture and repair is improved and a 100% tearing bond secured when Velsicol hydrocarbon resins are used with nitrile rubber.

VELSICOL RESINS ARE HIGH IN QUALITY . . . STABLE IN PRICE . . . CONSTANT IN AVAILABILITY!

Work with this man . . .

Your Velsicol representative, a qualified chemist who can help you make better products for less!

FREE
test samples and literature

VELSICOL CHEMICAL CORPORATION, 330 E. Grand Ave., Chicago 11, Ill,
INTERNATIONAL REPRESENTATIVE: VELSICOL INTERNATIONAL CORPORATION, C.A. P. O. BOX 1687, NASSAU, BAHAMAS, B.W.I. RA-7I

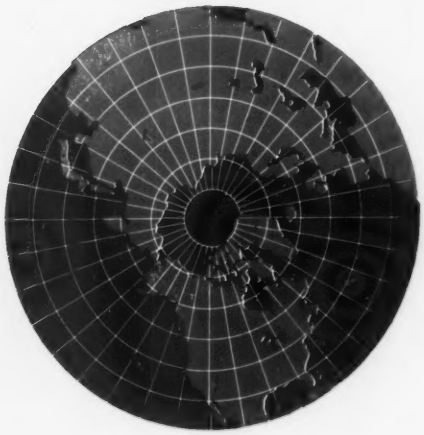
Gentlemen:
Please send me ☐ Literature on Hydrocarbon Resins for adhesives
☐ Please have a Velsicol representative call.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

VELSICOL

Sales Offices in: Chicago • Boston • Akron • Atlanta • Houston • Los Angeles • San Francisco • Toronto

CARBON BLACK WHEN YOU WANT IT



Whatever the clock may say... wherever you may be... a Witco-Continental Sales Office is ready to take care of your carbon black needs. Witco-Continental's plants are operated on a **continuous** production basis to assure you of quality carbon black in all grades whenever you need it.

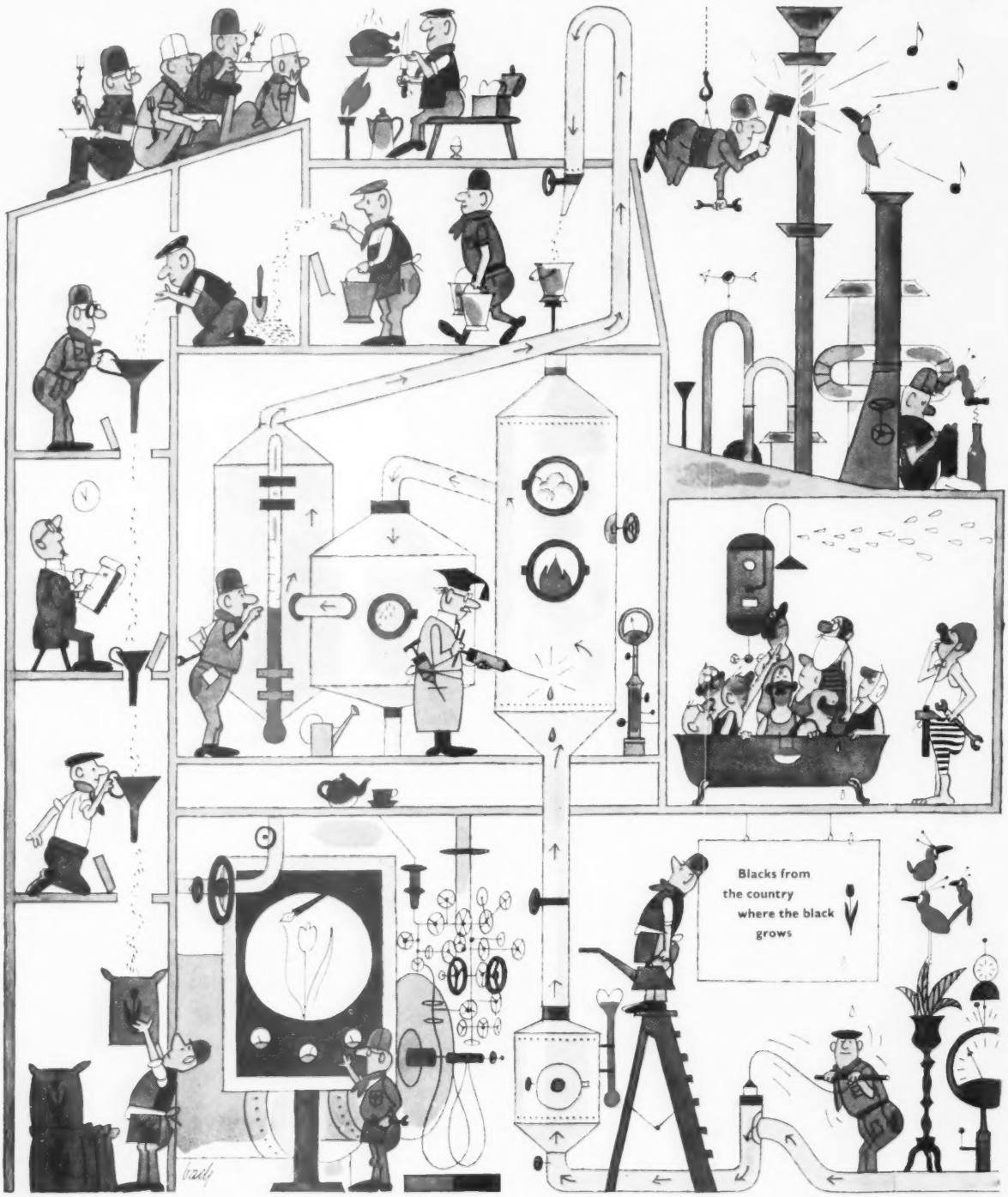
The moment you contact a Witco-Continental representative, a "Unified Control" system goes to work for you. Your requests are channeled through one integrated world organization to give you the product or service you need... backed up by advanced research and production facilities... in the shortest possible time.

Witco-Continental has expanded its capacity by fifty per cent—further assurance of getting the carbon black you want when you want it.

WITCO CHEMICAL COMPANY, Inc.
122 East 42nd Street • New York 17, N. Y.
CONTINENTAL CARBON COMPANY
4848 Guiton, Houston 27, Texas

and Montreal, Canada • London and Manchester, England • Glasgow, Scotland • Rotterdam, The Netherlands • Paris, France

KETJEN CARBON's modern plant serves the rubber industry



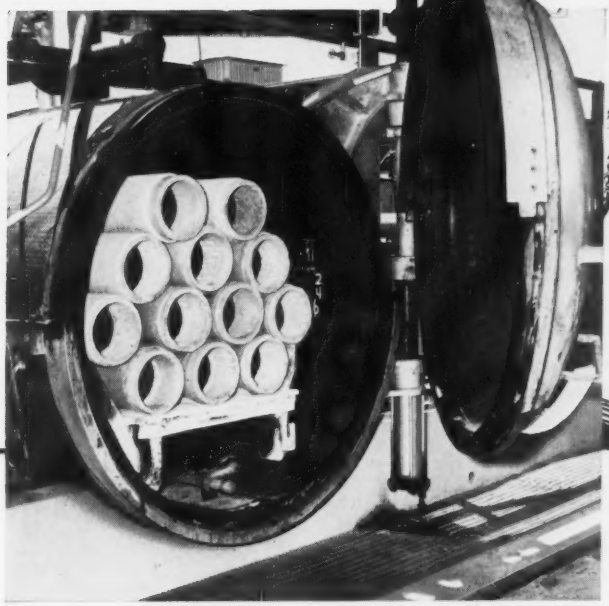
Sales office:

NEDERLANDSCH VERKOOPKANTOOR VOOR CHEMISCHE PRODUCTEN N.V.

63, Mauritskade, Amsterdam - Holland - P.O.B. 4038 - Tel. 54322 - Telex: 12270 - Telegrams: Chemicals

KC-422 E

KETJENBLACK ISAF • KETJENBLACK LHI • KETJENBLACK HAF • KETJENBLACK CR • KETJENBLACK FEF • KETJENBLACK FF • KETJENBLACK GPF • KETJENBLACK SRF

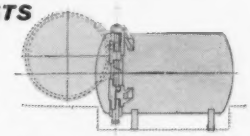


Memo to Production Engineers

◀ Adamson 90" dia. Hi-Lift Swing Door installed at Johns-Manville Products Corporation, Manville, N. J. One of many Adamson doors now in operation, or on order, for use in steam-curing TRANSITE® Pipe at J-M Plants in the U. S. and Canada.

Here are 6 important reasons why you should specify ADAMSON UNITED Hi-Lift Swing Vulcanizer & Autoclave Doors

1 LOWER INSTALLATION AND OPERATING COSTS



Adamson's lift-swing feature eliminates need for extended pit and expensive bridging. For example, on a 90" dia. door you can use an easily-handled loading bridge as short as 22".

2 TIGHT, LEAKPROOF SEAL

Adamson's special heat-resistant, self-sealing gasket utilizes vessel's internal pressure to assure a positive, leakproof seal.

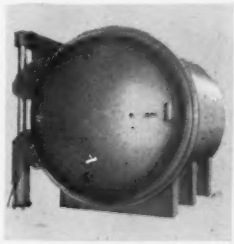
3 EFFICIENT SLIDE-LOCK DESIGN

Provides virtually 360° of locking surface between door and mating shell ring. *Twice* the locking area of conventional breech-lock doors!

4 SAFE, RELIABLE OPERATION

Equipped with automatic door locking pins. Can be furnished with optional steam interlock controls for complete safety. Other built-in safety features included.

5 STRONGER CONSTRUCTION



Conventional castings are replaced by sturdy pressed steel head welded to continuous roll forged locking rings.

6 FAST OPENING AND CLOSING

Quick-unlocking, vertical-lift action powered by hydraulic cylinder. Door swings easily on anti-friction and bronze sleeve bearings. Simple, trouble-free operation.

7067

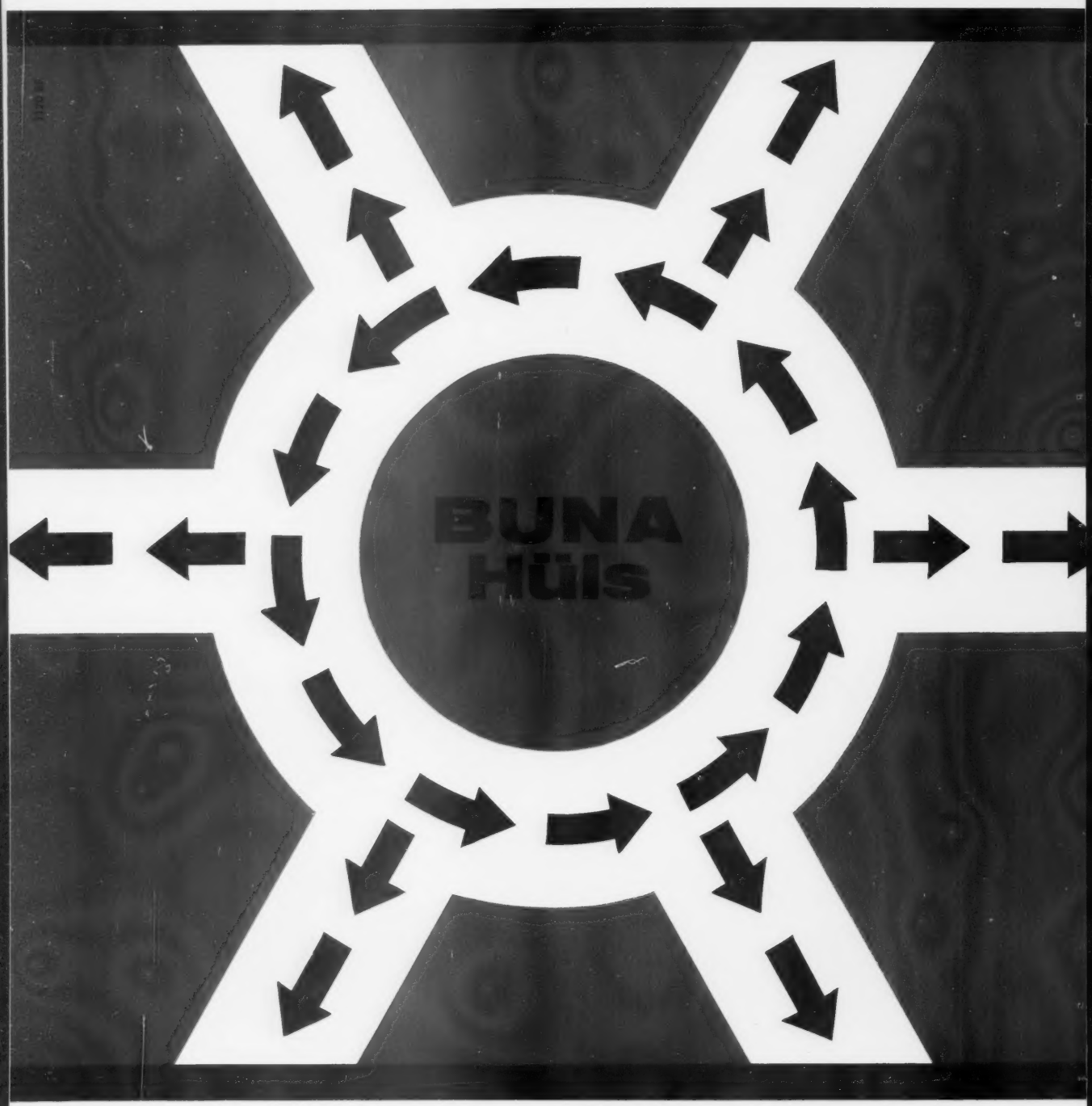
ADAMSON UNITED COMPANY

730 CARROLL STREET, AKRON 4, OHIO

Subsidiary of United Engineering and Foundry Company
Plants at Pittsburgh, Vandergrift, Wilmington, Youngstown, Canton

We offer a wide range of door sizes and pressures, available as integral equipment on vessels supplied by us, or as separate units for mounting on tanks made by other manufacturers. Write for catalog No. 562.

DESIGNERS AND BUILDERS OF BASIC MACHINERY AND EQUIPMENT FOR COMPLETE PROCESSES



The right grade of BUNA Hüls for every application

Seven standard grades, eight special grades and two types of latex – these comprise the BUNA Hüls range. The right material for every application. Every grade is correctly formulated and quality never varies.

Round-the-clock production at Bunawerke Hüls, coupled with adequate stocks ensure prompt delivery. This reduces storage costs for the processer.

STANDARD GRADES

BUNA Hüls 150
HS, staining

BUNA Hüls 152
HS, non-staining

BUNA Hüls 153
HS/FS, non-staining

BUNA Hüls 302
HS, staining, with 37.5 parts oil

BUNA Hüls 362
HS/FS, non-staining, with 37.5 parts oil

BUNA Hüls 372
HS, non-staining, with 37.5 parts oil

BUNA Hüls 378
HS, non-staining, with 50 parts oil

SPECIAL GRADES

BUNA Hüls BT 13
HS/FS, equivalent to BUNA Hüls 373

BUNA Hüls BT 21
HS/FS, equivalent to BUNA Hüls 302

Types with high Mooney values

BUNA Hüls BT 4
HS, staining, Mooney viscosity (ML_4) approx. 120

BUNA Hüls BT 22
HS/FS, equivalent to BT 4

BUNA Hüls BT 12
HS, non-staining, Mooney viscosity (ML_4) approx. 150

BUNA Hüls BT 15
HS, non-staining, Mooney viscosity (ML_4) approx. 130

Types with low Mooney values

BUNA Hüls BT 16
HS/FS, non-staining, Mooney viscosity (ML_4) approx. 40

BUNA Hüls BT 17
HS/FS, non-staining, Mooney viscosity (ML_4) approx. 30

LATICES

BUNA Hüls 200
HS, staining

BUNA Hüls 220
HS, unstabilised

General purpose type, specially suited for manufacture of tyres, conveyor belting, high quality shoe soles, technical mouldings and special items.

General purpose type for the manufacture of light coloured rubber goods and high quality shoe soles.

Specially developed for the production of very light coloured and transparent rubber goods and cable insulation.

Recommended for tyres, retreading, technical mouldings.

Light coloured and transparent grade with good processing characteristics on roll mill and calender; reduced tackiness during processing.

Excellent properties, specially suited for production of light coloured and transparent articles, white walled tyres.

For the economical production of moulded rubber goods of all types; raw material cost reduced.

The advantage of these two grades is that there is reduced tackiness when processing raw mixes on roll mills.

These grades are especially suitable for the production of heat resistant articles, e. g. high pressure gasketing, brake and clutch linings as well as for flame resistant rubber mixes with high chlorparaffin content; extremely low compression set in the case of grade BT 12; processability of BT 15 better than that of BT 12.

These grades are distinguished by the ease with which they take up fillers, better calendering properties and less shrinkage. Designed for the production of soft, easy flow rubber mixes (e. g. for rubber soles made by moulding direct to uppers); also for sponge rubber.

Used for impregnation of fabrics and tyres cord, also for casting purposes.

HS: rosin acid, FS: fatty acid

BUNA is a registered trademark

You can rely on BUNA Hüls
BUNAWERKE HÜLS GMBH · MARL · KREIS RECKLINGHAUSEN
Western Germany
Sales and Technical Service:
CHEMISCHE WERKE HÜLS AG · MARL · KREIS RECKLINGHAUSEN
Western Germany
BWH

Call Hall

HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 16

HALLCO C-566 SOFTENS, SMOOTHS BOTH NATURAL AND SYNTHETIC RUBBERS

As a plasticizing agent, Hallco C-566 is highly recommended for use in the processing of all types of natural, synthetic or reclaimed rubber. It is a superior break-down ingredient and aids in the dispersion of carbon black and other additives. This Hallco plasticizer will help obtain smoother tubing, finer extrusions and calendering. Used in amounts ranging from 1 to 10 parts it also tends to reduce scorch to a minimum. Hallco C-566 is a clear, oily, amber liquid of petroleum origin. This plasticizer is manufactured by The C. P. Hall Company and is available in drums or tank cars.

IMPROVE TENSILE ON YOUR BUTYL RECLAIM

Preliminary tests and reports from users indicate that our 4039-Y Reclaiming Oil improves tensile on butyl reclaim. The resulting stocks show easier processing characteristics and higher physical properties than can be expected from other reclaiming oils.

Further tests indicate that it is ideal for both scorched scrap and partly "set-up" stocks. A reduction in processing time and cost was also noted when 4039-Y was used in the reclamation of regular rubber. As little as 5% 4039-Y has completely reconditioned scorched Neoprene, according to manufacturers' and processors' reports. Stocks treated with it can be worked back into the original stock or used as a workaway in other stocks. 4039-Y is manufactured by The C. P. Hall Company.

P.S. Use our "Maglite® D" in your Neoprene batches and avoid scorching entirely!

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON	CHICAGO	MEMPHIS	LOS ANGELES	TORRANCE, CALIF.	NEWARK
Phone JEfferson 5-5175	Phone POrtsmouth 7-4600	Phone JAckson 6-8253	Phone SPruce 5-6666	Phone FAirfax 0-2211	Phone MArket 2-2652

(AP Wirephoto)

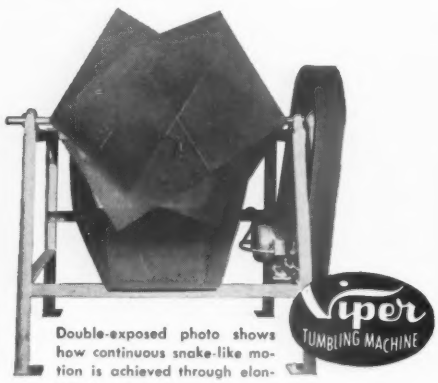
In a field of thoroughbreds, there's little to choose between the winner and the also-ran as they thunder down the homestretch. In the rubber industry, it's the same way. Marbon Chemical, the pioneer-leader in high styrene rubber reinforcing resins, gives you that little extra that makes the big difference. Important extras like a consistent high level of performance through rigid quality control, unsurpassed technical assistance, complete research and development facilities, total reliability and faster service through same-day shipments. Don't be satisfied with place or show. Put your money on a proven winner who has led the field right from the start—Marbon Chemical!

Get all the facts about Marbon high-styrene rubber reinforcing resins for shoe soles, floor tile, wire and cable, hard rubber and mechanical goods. Write Dept. V-7.

MARBON CHEMICAL DIVISION **BORG-WARNER**
WASHINGTON WEST VIRGINIA

Save over 30% of TUMBLING TIME!

Here is a revolutionary new way to deflash rubber, plastics and synthetic products with greater speed and economy. Based on an amazingly simple principle, the "Viper" tumbling chamber is designed in an elongated cube shape to achieve a continuous snake-like action in which abrasive motion is constant throughout the tumbling process. The "Viper" does a more thorough deflashing job on less power, and saves fully thirty per cent of "normal" tumbling time. It has already proven itself through extensive application in Accurate Products' routine manufacture of more than 4,000,000 parts per week.



Double-exposed photo shows how continuous snake-like motion is achieved through elongated cube design.

- Instantly usable for dry-ice, normal and abrasive tumbling
- Greater load capacity than any other tumbler of comparable size
- Quality construction assuring longer life, requiring less maintenance

AVAILABLE IN SINGLE OR DOUBLE UNITS
DISTRIBUTOR INQUIRIES INVITED

Write for detailed illustrated information

ACCURATE PRODUCTS COMPANY, INC.

4650 Santa Fe San Diego 9, California

PATENT REVIEW

by Melvin Nord

Pneumatic Tire Casing

U. S. Patent 2,958,359, issued November 1, 1960, to Roger G. X. Boussu, Louis P.F.A. Neuville, and Louis H. N. Saint-Frison, assigned to Compagnie General des Etablissements Michelin (Robert Puiseux & Cie), provides an improvement in the structure of tire casings to reduce wear and increase operating life.

One of the principal causes of wear in tires is the deviation stress (laterally-directed stress) during cornering (turning) while traveling at relatively high speeds. The deviation stress causes deformation of the area of the tread in contact with the road so that the normally elliptical contact area becomes somewhat kidney-shaped and the trailing end of the kidney-shaped contact area slides relative to the road, thereby wearing away the tread.

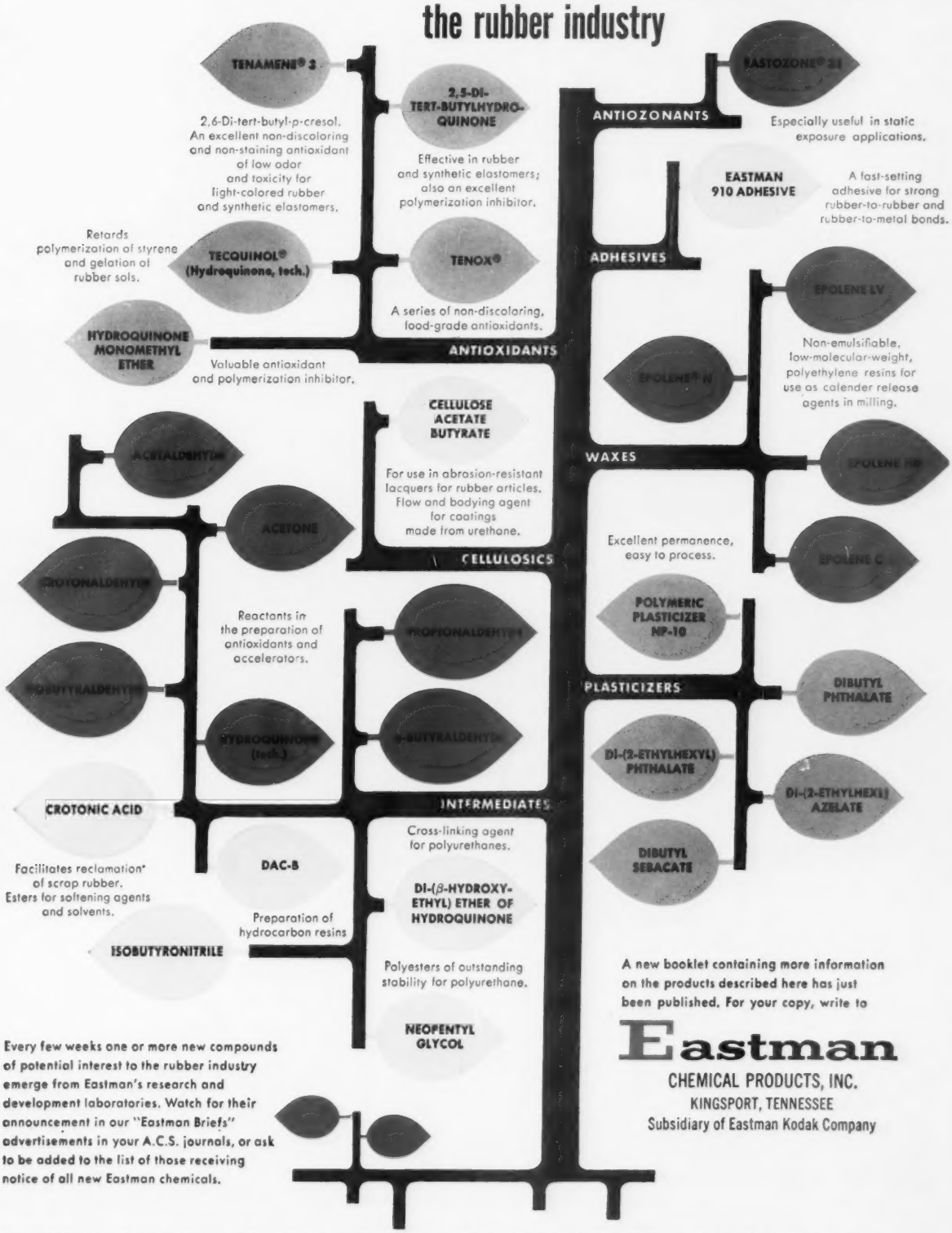
The present invention relates to tire casings which are constructed to resist deformation of the portion of the tread in contact with the road by deviation stresses. More particularly, tire casings in accordance with the present invention are constructed to render the lateral edges of the apex (tread zone) of the tire casing highly resistant to deformation by deviation stresses so that the area of the tread in contact with the road remains substantially elliptical in shape during cornering of the vehicle. Avoidance of deformation of the contact area of the tread not only decreases wear of the tread, but it also improves the resistance of the tire to skidding during cornering and thereby provides greatly improved roadability.

In accordance with the invention, the improved resistance to deformation of the tire casing is achieved by providing at the apex (tread zone) of the tire casing three circumferential zones extending generally parallel with the equator of the tire casing, the central zone extending along the equator of the tire and the other zones being disposed laterally on each side of the central zone and being of greater rigidity than the central zone. The greater rigidity of the lateral zones as compared with the central zone is obtained by reinforcing the tire casing with cords, threads, wires, or cables, formed of materials which are substantially noncompressible axially, such as metal wires or filaments, glass filaments, and suitably treated natural or synthetic fibers or filaments, which are more sharply inclined to the equator of the tire or disposed at a smaller angle in the lateral zones than the cables in the central zone of the tire.

As shown in Figures 1 and 2, adjacent to and overlapping the ends of the plies (17 and 18) is an

From Eastman...

A family of fine products to serve the rubber industry



Every few weeks one or more new compounds of potential interest to the rubber industry emerge from Eastman's research and development laboratories. Watch for their announcement in our "Eastman Briefs" advertisements in your A.C.S. journals, or ask to be added to the list of those receiving notice of all new Eastman chemicals.

A new booklet containing more information on the products described here has just been published. For your copy, write to

Eastman
CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE
Subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; Atlanta; Chicago; Cincinnati; Cleveland; Detroit; Framingham, Mass.; **Greensboro, N. C.;** Houston; New York; Philadelphia; St. Louis. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; **Seattle.**

CONFIDENCE
MEANS
EVERYTHING
!

in the case of rubber pigments
you can have CONFIDENCE in
IRON OXIDES
made by WILLIAMS

R-1599 ! R-2200 !
R-2199 ! R-2900 !
R-2899 ! R-3200 !
and the KROMA REDS!

Want uniformity of pigment product? You get it . . . when you specify a Williams pigment.

Each pigment made by Williams is manufactured to rigid specifications for copper and manganese content, ph value, soluble salts, fineness, color, tint and strength by controlled processes . . . and with special equipment.

If you haven't already done so, try these finest of all oxide pigments. For over 82 years . . . pigments have been our business . . . and this experience is your guarantee of absolute uniformity of pigment product.

See your Williams Representative or write us direct for complete technical data. Address Dept. B.
C. K. Williams & Co., 640 N. 13th St., Easton, Pa.

C. K. WILLIAMS & CO.
E. ST. LOUIS, ILL. • EASTON, PA. • EMERYVILLE, CAL.

IRON OXIDES • CHROMIUM OXIDES • EXTENDER PIGMENTS

WILLIAMS
COLORS & PIGMENTS

"Rubber Pigment Technology at its best"

PATENT REVIEW

apex ply (19) containing cables (20) which are arranged in parallel relation and extend meridianally of the tire casing. Also, the sidewall plies (17 and 18) contain parallel cables (21 and 22), which extend meridianally of the tire casing or perpendicular to its equator.

In the center zone of the tread portion of the carcass are arranged two plies (23 and 24), each containing parallel cables (25 and 26). As shown

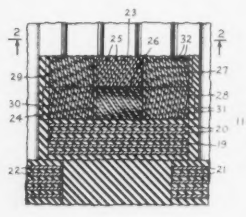


Fig. 1

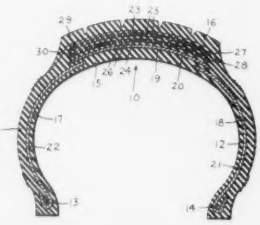


Fig. 2

in Figure 1, the cables (25) of the ply (23) are inclined at an acute angle to the equator of the tire casing. Also, the cables (26) of the ply (24) are arranged at an acute angle to the equator of the tire casing and are also inclined to the cables (25) of the ply (23) so that the cables in the plies (23 and 24) cross and in conjunction with the meridianally disposed cables (20) of the ply (19) form a triangulated structure extending circumferentially of the tire casing in the central part of the tread zone (15) of the tire casing.

On opposite sides of the central band or zone are arranged strips or plies (27, 28, 29 and 30). The innermost ply (28) contains a series of parallel cables (31) which are inclined more sharply or at a smaller angle to the equator of the tire casing than the cables (25 and 26). The ply (27) also includes cables (32) in parallel relation which are inclined to the equator of the tire casing at about the same angle as the cables (31) but crossing these cables.

The cables in the plies (29 and 30) are arranged similarly to the arrangement of the cables (31 and 32) so that in conjunction with the meridianal cables (20) in the ply (19), a triangulation of the cables is produced in which the triangles have more acute apex angles extending circumferentially of the casing than the triangles formed by the cables of the plies (23, 24 and 19). Due to the shape of the triangles, the lateral zones containing the plies (27, 28, 29 and 30) are much more rigid than the central zone containing the plies (23 and 24) and, hence, are much more resistant to deviation stresses than tire casings heretofore produced.

..."tall in the saddle"

In western lingo "tall in the saddle" means dominant position . . . and that will be your position when you use the Sid Richardson Carbon Co. as your source of supply for **CHANNEL BLACKS.**

We are producing **CHANNEL BLACKS** for you because of their distinctive properties that provide superior values in many rubber compounds.

We are continuing our large production and are maintaining our large inventories so as to serve you well today and tomorrow.

TEXAS
CARBON BLACKS

Sid Richardson
CARBON CO.

FORT WORTH, TEXAS

GENERAL SALES OFFICES
EVANS BUILDING
AKRON 8, OHIO

The brown types of Factice® are made from various vegetable oils by vulcanizing with sulphur and heat. The choice of the proper grade of brown Factice® to be used in a compound is highly important. The percentage to be used depends on the type of formulation and softness desired.

The brown types are compatible with crude rubber, Neoprene, Buna S and Buna N type polymers. Send us your compounding formula for our suggestions. All formulas held in strict confidence. Our trained staff will help in selecting the proper vulcanized vegetable oil for your need . . . Factice® White, Brown, Neophax or Amberex.

Factice Vulcanized Oil

THE STAMFORD RUBBER SUPPLY CO.
STAMFORD, CONN.

PATENT REVIEW

Propellants from Depolymerized Rubber

U. S. Patent 2,953,446, issued September 20, 1960, to Thomas J. Engelbach, assigned to Borne Chemical Co., Inc., discloses a solid fuel consisting of cured depolymerized rubber and an alkali metal oxidizing agent.

The fuel is produced by forming a mixture of 100 parts by weight of depolymerized rubber having a viscosity of 20,000 to 150,000 cp. at 150°F., 2 to 6 parts by weight of a water-insoluble zinc salt of an acid, 2 to 6 parts by weight of a liquid salt of a dialkylated dithiocarbamic acid, and 200 to 800 parts by weight of the alkali metal oxidizing agent. The depolymerized rubber is cured to a solid mass.

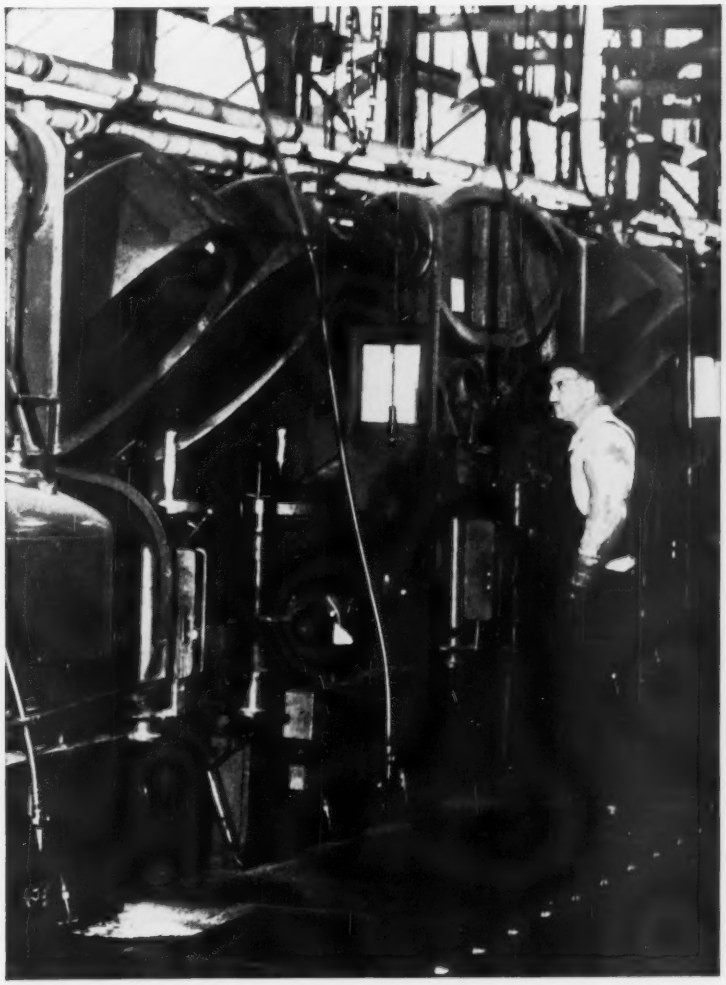
Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Detachable tire tread	Tibor A. Firestone	2,948,318	8/9/60
Co-vulcanized butyl rubber with highly unsaturated rubbers	Esso Research & Engineering Co.	2,948,320	8/9/60
Apparatus for post-curing inflation of pneumatic tires	Cooper Tire & Rubber Co.	2,948,921	8/16/60
Tire shaping and tread centering device	Maurice Clapp	2,948,924	8/16/60
Mold for making a spiral threaded rubber molded article	La Favorite Rubber Mfg. Co.	2,949,636	8/23/60
Tubeless tire	Esso Research & Engineering Co.	2,949,952	8/23/60
Emergency tire	General Tire & Rubber Co.	2,951,524	9/6/60
Tire building machine	Goodyear Tire & Rubber Co.	2,951,526	9/6/60
Fluoroelastomers	E. I. du Pont de Nemours & Co.	2,951,832	9/6/60
Flexible shaft couplings	U. S. Rubber Co.	2,952,143	9/13/60
Laminated tire structure	Esso Research & Engineering Co.	2,952,291	9/13/60
Tire bead grommet	B. F. Goodrich Co.	2,952,293	9/13/60
Butyl rubber powder	U. S. Rubber Co.	2,952,650	9/13/60
Aldehyde-modified butyl rubber	Esso Research & Engineering Co.	2,952,657	9/13/60

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

SILICONE NEWS from Dow Corning

Keep Production Moving



Serviceability Unlimited! Water dilutable emulsions, solvent soluble fluids, greaselike compounds, or spray formulations — there's a Dow Corning release agent to solve release problems with any type of rubber or plastic.

Let Dow Corning field engineers help you select the silicone mold lubricant best for each application in your plant.

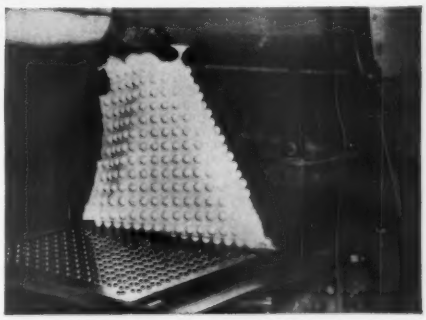
Other Cost-Cutting Silicones that can save you time are silicone electrical insulation for mill and mixer motors; silicone paints that withstand heat, oxidation, and weathering; Silastic® gums and bases for compounding silicone rubbers for unusual service; and Syl-off® coated paper as interleaving sheets in slab molding polyurethane and as a "no-stick" packaging material for sticky products. Write for full information today. Address Dept. 8619.

Silicone Mold Lubricants Give Fast, Clean Release with Minimum Build-up

Rubber and plastic products break away FAST and CLEAN from molds made "stick-free" with Dow Corning Silicones. These job-proved parting agents prevent sticking; assure good reproduction of fine surface detail; prevent tearing; keep rejects to a minimum.

Another money-saving feature: Heat resistant Dow Corning silicone release agents won't carbonize! Build-up on molds is negligible—meaning your mold cleaning costs go down, mold service life goes up.

In short, Dow Corning silicone mold lubricants help you mold superior products—help you maintain economical high speed production.

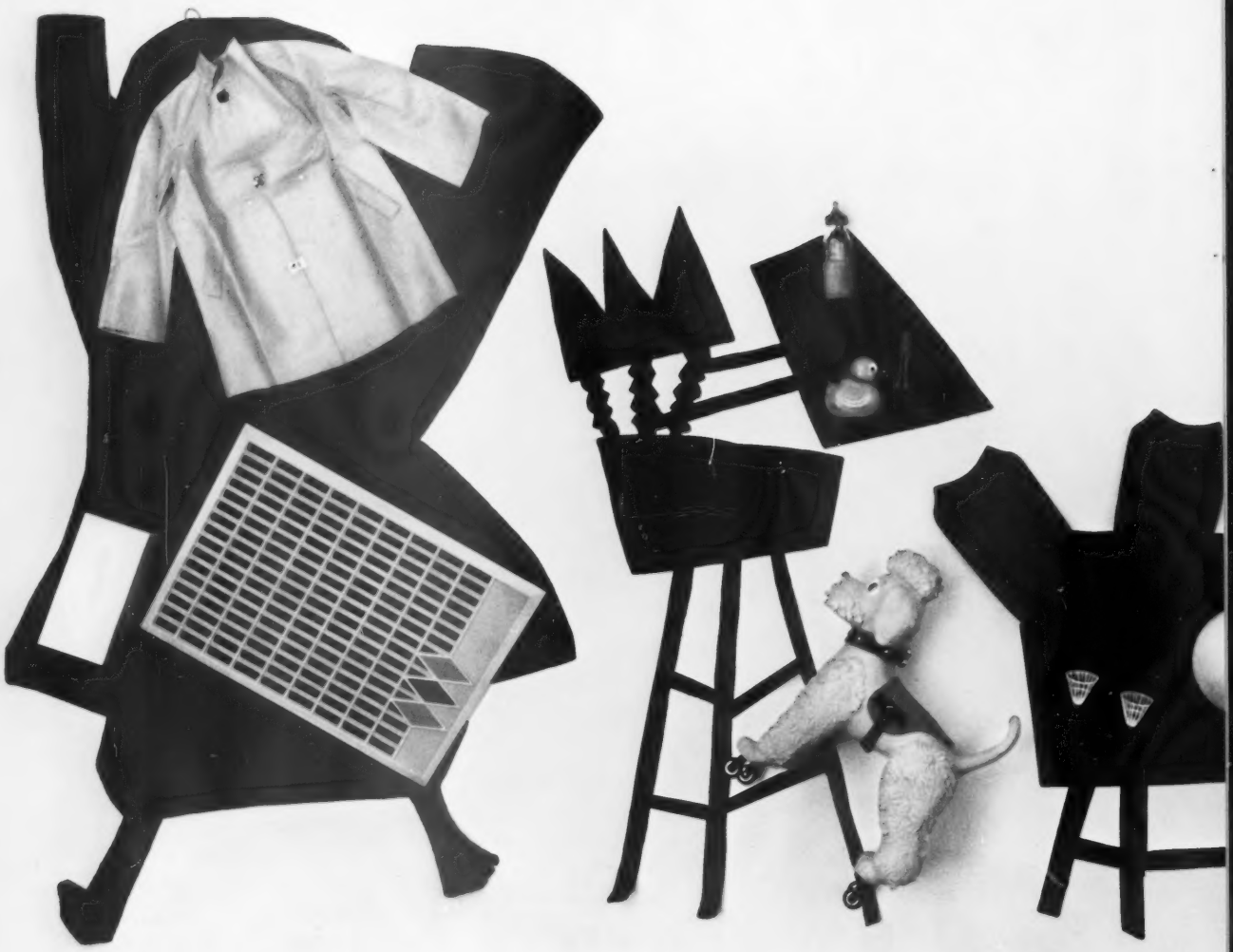


Your best source of technical assistance in adapting silicones to your products or operation is the Dow Corning office nearest you.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.



LET HI-SIL®, SILENE® & CALCENE®
BRIGHTEN YOUR SALES SCENE
WITH COLOR

Every corner of today's bright new home offers profit opportunities for colored rubber goods. Let the eye-grabbing power of color brighten *your* corner . . . whether it be raincoats, racks or rubber footwear.

Columbia-Southern's team of quality *white* reinforcing pigments gives you the key to a door-opening array of hues, tones and shades. Even industrial goods can gain with color, for visual coding or brand identity.

Hi-Sil, Silene and Calcene provide the excellent physicals that your product needs, too. Any level of general properties or specific qualities can be produced by straight or combination loadings of the three pigments.

We'd like to be helpful in exploring color's usefulness in your line, or the upgrading of some physical in present goods. Why not write us at Pittsburgh or our district office nearest you?

PPG columbia | southern chemicals
CHEMICAL DIVISION
PITTSBURGH PLATE GLASS COMPANY

ONE GATEWAY CENTER, PITTSBURGH 22, PENNSYLVANIA
DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati
Cleveland • Dallas • Houston • Minneapolis • New Orleans
New York • Philadelphia • Pittsburgh • San Francisco • St. Louis
IN CANADA: Standard Chemical Limited

Naugatuck RECLAIM

Investigate these advantages of **RECLAIM** for adhesives

In adhesive applications by the dozens, you can do the job at least as well, often better, and frequently *reduce your costs* by the use of Naugatuck Reclaimed Rubber especially processed for adhesive applications. Investigate these important advantages:

• Stable low cost • High uniformity • Shorter mixing time • Faster processing • Excellent aging characteristics • Good resistance to heat flow • Good sprayability • High stability • Good film tack • Good adhesion to a wide variety of materials, including metals, fabric and wood.

The variety of Naugatuck Reclaimed Rubbers available, including low-staining grades for such applications as pressure-sensitive tape, is fully described in Naugatuck's informative booklet, "Reclaimed Rubber." Send for your copy today.

Naugatuck Chemical

Division of United States Rubber Company

711R Elm Street
Naugatuck, Connecticut

US RUBBER

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

LIGNITE TAR FRACTIONS

as Antioxidants and Plasticizers for Rubber

By R. A. CLARK* and W. J. MUELLER
Battelle Memorial Institute, Columbus, Ohio

THE investigation reported here is part of an extended study of the utilization of Texas lignite tar carried out by the Texas Power and Light Company and the Aluminum Company of America. The tar fractions studied were produced by new and novel separation methods, and their application in rubber has not previously been reported. The process for preparing these fractions has been described by Batchelder, Filbert, and Mink *(1)*. Essentially, the method consists of a simultaneous dual extraction of lignite tar with aqueous methanol and hexane in a rotating disc contactor, followed by distillation steps to separate the solvents from the extracted materials and to further refine the initial products obtained. The lignite tar starting material was produced in a prototype Parry carbonizer at the Rockdale, Texas, works of the Aluminum Company of America.

The procedures followed for carbonizing, extracting, and refining involve a minimum of thermal cracking of the original constituents in the lignite tar; the products obtained are different from any obtained from coal tar, and this distinction is important.

A thorough study has been made of the composition of lignite tar. Kahler, Rowlands, Brewer, Powell, and Ellis *(2)* found that "the solvent-extraction process divides the primary tar so that most of the tar acids are soluble in the methanol-water phase, and most of the neutral oil is soluble in the hexane phase; the tar bases are divided evenly between the two phases." Their data show that the methanol solubles are primarily tar acids; phenols, cresols, xylenols and ethylphenols in the low boiling fraction, and homologues of these, together with naphthols, indanols and polyhydric phenols in the high boiling fraction. So far as is known, this latter material is unique and not readily obtainable by any other procedure. The neutral oil (primarily present in hexane solubles) is made up of paraffins, olefins, aromatics, and certain polar compounds. The tar bases, present in only small amounts, are heterocyclics, such as the pyridines and quinolines.

It was the presence of large amounts of phenolic constituents in methanol solubles that led to conjecture that this extract might possess antioxidant properties. Similarly, the hydrocarbon nature of the hexane solubles indicated the possibility that this extract might make a good softener or plasticizer. As the evaluation of both classes of materials in rubber progressed, it became evident that these were valid assumptions. However, it was also learned that hexane solubles had appreciable antioxidant properties, which are accounted for on the basis of incomplete removal of phenolic constituents by aqueous methanol.

The majority of the studies reported here were conducted with lignite tar fractions produced in a small-scale pilot plant at Battelle. Verification of this work was also carried out with similar fractions produced in a prototype solvent extraction plant at Rockdale, capable of processing 1,000 gallons of tar a day. Fractions from the latter source were deliberately made with slightly higher initial boiling points, in order to minimize odor and staining. However, materials from both sources had essentially the same chemical composition. While the composition and properties of the products were carefully controlled in production, it is possible to adjust operating conditions to tailor-make fractions with different boiling points or other physical characteristics. By blending methanol solubles and hexane solubles, it is possible to obtain products with intermediate chemical composition.

Lignite tar materials investigated in this research are:

(1) TMS —Total methanol solubles
(2) HBMS—High-boiling methanol solubles
(3) HBHS—High-boiling hexane solubles
(4) MBHS—Medium-boiling hexane solubles.

* Mr. Clark is now at Brunswick Corp., Muskegon, Mich.

The physical properties of these fractions have been reported previously by Batchelder, Filbert, and Mink *(1)*, although the present terminology has been modified to reflect physical properties rather than production procedure. Thus, the hexane soluble fractions will be referred to as high-boiling hexane solubles (instead of hexane soluble residue) and medium-boiling hexane solubles (instead of hexane soluble distillate). In actuality, of course, the high-boiling methanol solubles and the high-boiling hexane solubles are prepared by identical procedures, except from different solvent extracts.

Equipment and Procedures

Most of the rubber compounding for the antioxidant studies was conducted on a 6 by 12 inch laboratory mill, using commercially available dry rubber polymers. Masterbatches were prepared that contained all ingredients except the antioxidant component. The various control and experimental antioxidants were then individually added to portions of the masterbatch on the same mill. A variation in this procedure occurred in one part of the investigation in which antioxidant-free SBR-1500 was employed. In this case, a commercial antioxidant-free latex was obtained and coagulated in the laboratory, using the following coagulant mixture:

Material	Parts
Water	81
Isopropanol	10
Sodium chloride	8
Glacial acetic acid	0.17
Alum	0.40

The precipitated polymer was washed and dried in an oven at approximately 140° F. The masterbatch for this particular polymer was prepared in a B-size Banbury, although, as before, the variable ingredients were incorporated on a laboratory mill.

The Banbury was also used to prepare masterbatches for the evaluation of lignite tar materials as plasticizers. Again, the variable component was incorporated into portions of the masterbatch on a rubber mill. The necessary test samples were prepared and molded in accordance with ASTM Designation D-15-55T. The procedures for testing these are as follows:

Mooney Viscosity—ASTM Designation D-927-57T: The Mooney viscosity was determined after four minutes at 212° F., using the large rotor.

Mooney Scorch and Cure Time—ASTM Designation D-1077-55T: Mooney scorch and cure time were determined by measuring Mooney viscosity at either 280° or 302° F. The time for the Mooney to rise 20 or 35 points above the minimum was designated as the cure time, while 5 points above the minimum was the scorch time.

Stress-Strain—ASTM Designation D-412-51T: Stress-strain properties were measured on dumbbells cut from 6 by 6 by 0.075-inch tensile sheets using Die C. The specimens were pulled on the Scott Tester operated at 20 inches per minute.

Hardness—ASTM Designation D-314-52T: A Shore A2 durometer was used.

Heat Aging—ASTM Designation D-865-57: Specimens were aged at 212° F. in test tubes placed in an aluminum block heater for 4 and 7 day aging periods.

Oxygen Bomb Aging—ASTM Designation D-572-53: Specimens were aged 96 hours in oxygen at 90° C. and 300 psi.

Compression Set—ASTM Designation D-395-55: Method B of this procedure was used with test conditions of 22 hours at 158° F.

Brittle Point—ASTM Designation D-746-55T: In this test procedure, the temperature was determined at which 50 per cent of the samples failed.

Tear Resistance—ASTM Designation D-624-54: Die C was used in this test.

Crack Growth—ASTM Designation D-813-57T: Specimens containing a cut 0.1 inch long were flexed until the cut was approximately 0.75 inches long. The rate of crack growth was determined from a plot of crack size versus time.

Contact and Migration Staining—ASTM Designation D-925-55: Staining and discoloration were measured on metal panels coated with a white enamel which does not stain nor discolor (61K-643 White Gloss Lacquer, Stanley Chemical Company, East Berlin, Connecticut).

Heat Build-up—ASTM Designation D-623-52T: Heat build-up was measured with a Goodrich Flexometer operating for 30 minutes with a 0.175 inch stroke, 143 psi on the sample, and at an initial temperature of 100° F.

Permanent Set—ASTM Designation D-412-51T: Permanent set was measured by stretching the samples to 400 per cent, holding for 10 minutes, releasing, and measuring length after 10 minutes relaxation.

Quality Index: The method of Juve *(3)* was used for obtaining quality index from data on modulus, heat buildup, and crack growth. His empirical relationships, from which he determined the quality index, are as follows:

(1) $\text{Log flex life} = 0.0126\ \Delta t + \frac{4.28}{M}$

(2) $\text{Log flex life} = 5.42 + \frac{\Delta t}{336} - \frac{M}{2000}$

(3) Quality index = log flex life from experiment divided by log flex life calculated from Expression 1 or 2, where flex life = the number of flexes to obtain a crack growth of 0.720 inches.

Δt = heat build-up, F

M = 300 per cent modulus, psi

Plasticizer Volatility: Volatility of the plasticizer

Recipe — Table I

Ingredient	Parts by Weight
Smoked sheet	100
EPC black	40
Zinc oxide	5
Stearic acid	3
Sulfur	3
Benzothiazyl disulfide	1
Antioxidant	As shown

Recipe — Table II

Ingredient	Parts by Weight
SBR-1500	100
EPC black	40
Zinc oxide	5
Stearic acid	1.5
Sulfur	2
Benzothiazyl disulfide	3
Antioxidant	As shown

Table I—Effect of Lignite Tar Materials as Antioxidants in Natural Rubber

Antioxidant Added	Amount, phr	Cure, min at 284 F	Unaged: 300 Per Cent Modulus, psi	Unaged: Tensile Strength, psi	Unaged: Elongation, per cent	Unaged: Hardness, Shore A-2	Aged 4 Days at 212 F: Tensile Strength, psi	Aged 4 Days at 212 F: Elongation, per cent	Aged 4 Days at 212 F: Hardness, Shore A-2	Aged 7 Days at 212 F: Tensile Strength, psi	Aged 7 Days at 212 F: Elongation, per cent	Aged 7 Days at 212 F: Hardness, Shore A-2
None	–	15	1560	2920	560	65	1200	110	82	1230	110	81
		30	2010	3110	490	72	1400	140	80	870	80	83
		60	2140	2780	410	75	1010	120	81	720	70	83
PBNA	2	15	1570	2930	550	65	2470	330	79	1470	160	84
		30	1980	3170	490	72	2140	250	81	1320	130	83
		60	2030	2940	440	73	1610	190	80	1420	160	82
DBPC	2	15	1400	2760	570	63	2380	280	81	1410	120	83
		30	1810	2930	510	70	1950	200	83	1580	170	80
		60	2020	2870	440	73	1780	200	82	1480	160	84
TMS	2	15	1480	3050	590	68	1900	190	83	1310	110	85
		30	1840	3090	510	75	1770	150	84	1320	120	84
		60	2040	2940	460	76	1380	150	84	1220	140	85
TMS	5	15	1550	3010	580	74	1830	180	86	1590	150	87
		30	1830	3040	580	74	1890	200	87	1350	120	88
		60	1890	2890	480	76	1580	160	86	1240	120	86
TMS	10	15	1590	2920	560	79	1760	220	90	1780	230	87
		30	1730	2760	490	80	1760	220	89	1380	150	90
		60	1740	2710	460	80	1630	220	87	1220	130	90
HBMS	2	15	1430	2930	590	66	1800	170	84	1570	140	85
		30	1800	3000	510	72	1640	150	85	1340	120	85
		60	2090	3020	460	76	1410	150	87	1000	100	85
HBMS	5	15	1580	2910	560	74	2090	230	87	1590	150	85
		30	1760	2840	490	79	2160	270	85	1400	140	87
		60	1820	2860	480	80	1690	250	80	1190	120	85
HBMS	10	15	1560	2910	560	80	1870	250	90	1560	200	89
		30	1690	2690	460	84	1840	250	90	1410	160	89
		60	1670	2730	500	84	1790	250	88	1360	150	85

Table II—Effect of Lignite Tar Materials on Aging Properties of SBR-1500 (Antioxidant Free)

Antioxidant Added	Amount, phr	Cure, min at 302 F	Unaged: 100 Per Cent Modulus, psi	Unaged: Tensile Strength, psi	Unaged: Elongation, per cent	Unaged: Hardness, Shore A-2	Aged 4 Days at 212 F: 100 Per Cent Modulus, psi	Aged 4 Days at 212 F: Tensile Strength, psi	Aged 4 Days at 212 F: Elongation, per cent	Aged 4 Days at 212 F: Hardness, Shore A-2	Aged 7 Days at 212 F: 100 Per Cent Modulus, psi	Aged 7 Days at 212 F: Tensile Strength, psi	Aged 7 Days at 212 F: Elongation, per cent	Aged 7 Days at 212 F: Hardness, Shore A-2
None	–	20	100	2950	700	60	890	1460	130	72	–	950	70	79
		40	180	3600	570	64	900	1420	130	75	–	970	80	79
		80	220	3300	490	66	900	1600	150	75	1100	1120	110	79
PBNA	2	20	100	2900	750	61	850	1900	180	72	1280	1400	110	78
		40	150	3350	630	63	700	1900	190	72	1000	1660	140	77
		80	290	3620	530	65	600	2550	260	70	700	2100	200	75
DBPC	2	20	90	2000	820	59	640	1910	200	72	1280	1400	140	76
		40	120	2850	700	62	620	1650	180	72	1000	1660	130	75
		80	200	3200	600	63	520	2200	250	70	700	2100	230	73
Hydrocarbon softener	5	20	70	2800	880	56	550	1700	180	70	950	1350	120	74
		40	100	3050	700	60	480	1700	220	70	650	1250	130	72
		80	190	3620	620	61	310	2700	370	67	450	2210	260	70
Hydrocarbon softener	10	20	40	2250	900	54	550	1650	200	69	890	1520	140	73
		40	90	3090	760	58	370	2210	300	66	480	1790	220	70
		80	120	3170	640	60	350	2450	320	65	400	2010	250	70
HBMS	5	20	100	3040	810	61	500	2450	260	72	670	2200	230	75
		40	180	3700	670	66	400	3200	400	71	560	2820	300	74
		80	210	3650	600	67	400	3020	410	71	550	2820	330	75
HBMS	10	20	180	3600	680	66	540	2950	360	73	650	2900	320	78
		40	210	3800	620	68	400	3320	450	73	550	3050	370	78
		80	210	3850	620	69	400	3300	480	70	480	3200	430	78
HBHS	5	20	80	2700	860	57	600	1500	180	72	680	1350	150	74
		40	120	3500	730	60	510	2320	270	70	780	1280	140	74
		80	160	3650	600	63	420	2400	300	68	500	1710	230	71
HBHS	10	20	90	2620	810	58	550	2090	240	71	900	1080	110	75
		40	110	3360	700	62	480	2410	310	68	580	2210	250	71
		80	130	3350	600	64	360	2690	400	67	420	2460	320	70
2.5:1 HBHS:HBMS	5	20	90	2650	870	60	590	1800	210	71	690	2210	230	73
		40	140	3180	670	64	500	2600	310	70	600	1900	210	73
		80	180	3350	620	65	420	2650	360	69	510	2400	280	73
2.5:1 HBHS:HBMS	10	20	70	3000	860	61	500	2570	320	71	720	1800	190	76
		40	110	3750	720	63	400	2900	410	70	490	2320	300	74
		80	160	3660	660	65	320	2780	430	68	430	2800	370	73

TABLE III—EFFECT OF LIGNITE TAR MATERIALS ON OXYGEN-BOMB AGING AND CRACK GROWTH OF SBR-1500 (ANTIOXIDANT FREE)

Antioxidant Added[a]	Amount, phr	Cure, min at 302 F	Unaged: 100 Per Cent Modulus, psi	Unaged: Tensile Strength, psi	Unaged: Elongation, per cent	Unaged: Hardness, Shore A-2	Aged in Oxygen-Bomb 24 Hours at 90 C and 300 PSI: 100 Per Cent Modulus, psi	Aged in Oxygen-Bomb 24 Hours at 90 C and 300 PSI: Tensile Strength, psi	Aged in Oxygen-Bomb 24 Hours at 90 C and 300 PSI: Elongation, per cent	Aged in Oxygen-Bomb 24 Hours at 90 C and 300 PSI: Hardness, Shore A-2	Crack Growth, kilocycles to 0.5 inch
None	–	20	100	2950	700	60	200	2200	620	64	45
		40	180	3600	570	64	290	2650	520	67	18
		80	220	3300	490	66	270	2500	440	71	18
PBNA	2	20	100	2900	750	61	250	2700	540	66	63
		40	150	3350	630	63	300	2900	460	67	27
		80	290	3620	530	65	400	2900	430	69	23.4
DBPC	2	20	90	2000	820	59	190	2400	690	63	72
		40	120	2850	700	62	200	2910	560	66	126
		80	200	3200	600	63	260	2900	500	68	36
Hydrocarbon softener	5	20	70	2800	880	56	100	2450	720	61	>900
		40	100	3050	700	60	150	2950	690	64	7
		80	190	3620	620	61	210	2980	550	66	3.5
Hydrocarbon softener	10	20	40	2250	900	54	90	2350	800	59	4.5
		40	90	3090	760	58	110	2820	680	61	3.2
		80	120	3170	640	60	180	2700	590	64	3.2
HBMS	5	20	100	3040	810	61	200	3500	700	68	7.5
		40	180	3700	670	66	300	3450	580	70	10
		80	210	3650	600	67	340	3380	520	71	8.5
HBMS	10	20	180	3600	680	66	400	3620	580	73	3
		40	210	3800	620	68	400	3720	570	75	6
		80	210	3850	620	69	410	3600	570	75	4
HBHS	5	20	80	2700	860	57	150	2900	770	63	4.5
		40	120	3500	730	60	250	3010	610	66	6.5
		80	160	3650	600	63	280	3300	540	69	4
HBHS	10	20	90	2620	810	58	200	2880	680	65	14
		40	110	3360	700	62	270	3100	600	67	15
		80	130	3350	600	64	300	3000	550	69	3
2.5:1 HBHS:HBMS	5	20	90	2650	870	60	200	2720	680	67	8
		40	140	3180	670	64	280	3280	620	68	2
		80	180	3350	620	65	300	3000	520	70	2.5
2.5:1 HBHS:HBMS	10	20	70	3000	860	61	210	3480	720	67	8.5
		40	110	3750	720	63	260	3450	620	69	6.5
		80	160	3660	660	65	310	3350	580	72	6.5

(a) Recipe same as shown in Table 2.

was measured by determining the loss in weight of specimens after aging four days at 212° F.

Natural Rubber Antioxidants

While natural rubber contains certain materials that act as antioxidants, these are reported to be destroyed in the vulcanization process. Therefore, the vulcanized material can be considered to be essentially antioxidant-free. For this reason, natural rubber was chosen for the preliminary evaluation of lignite tar materials as antioxidants. Total methanol solubles (TMS) and high-boiling methanol solubles (HBMS) prepared at Battelle were evaluated at concentration

TABLE IV—EFFECT OF LIGNITE TAR MATERIALS ON PROPERTIES OF SBR-1500 (ANTIOXIDANT FREE)

Antioxidant Added[a]	Amount, phr	Mooney Viscosity ML-4 at 212°F.	Mooney Scorch at 280°F., SR			Contact Staining[b] (24 Hours at 175°F.)	Migration Staining[b] (24 Hours at 140°F.)
			Minimum Viscosity	Δ5, minutes	Δ20, minutes		
None	—	58	26	14½	21¼	0	0
PBNA	2	47	19	15½	19	3	3
DBPC	2	46	17	16½	23½	1	0
Hydrocarbon softener	5	45	17	13	24	1	0
Hydrocarbon softener	10	42	9	17	22¾	2	0
HBMS	5	58	26	11	15	3	2
HBMS	10	49	21	7	10	4	3
HBHS	5	50	22	15¾	23	2	0
HBHS	10	38	9	15	19½	3	0
2.5:1 HBHS:HBMS	5	47	15	14½	19¼	3	0
2.5:1 HBHS:HBMS	10	46	16	14½	20¼	3	1

(a) Recipe same as shown in Table II.
(b) 0 equals no stain and 4 is maximum stain obtained with set of specimens.

levels of 2, 5, and 10 phr (parts per hundred rubber) with two commercial antioxidants, phenyl-beta-naphthylamine (PBNA) and di-tert-butyl-paracresol (DBPC), as controls.

The results of the natural rubber study are presented in Table I. In some cases the lignite tar materials produced a slight decrease in unaged tensile strength and modulus, indicating some plasticizing action on their part. Properties after four days aging indicate that the highest concentrations of HBMS (five and 10 phr) have antioxidant properties approximately equal to those of two phr of PBNA or DBPC; that is, there was comparable retention of tensile strength and elongation after aging. Although all concentrations of TMS and two phr of HBMS showed some antioxidant activity, their effectiveness was less than that of two phr of PBNA. From these results, it is evident that HBMS is the preferred antioxidant and that the best concentration level for its use in natural rubber is five phr or more.

SBR-1500 Antioxidants

In order to determine the effect of lignite tar materials as antioxidants in SBR, it was decided that antioxidant-free SBR should be used in the preliminary evaluation. It was anticipated that differences between antioxidants would be accentuated by starting with an antioxidant-free polymer and a general indication might be obtained on the possible use of lignite tar materials as antioxidants that could be added by co-precipitation, even though incorporation in this instance was by milling. Since dry antioxidant-free SBR was not available commercially, it was prepared from the latex, as indicated in an earlier section of this report.

In Table II HBMS, HBHS, and a 2½ to 1 blend of HBHS and HBMS, all prepared at Battelle, are compared to three commercial controls. The data show that HBMS had the best antioxidant properties, as judged by its ability to aid in the retention of rubber tensile strength and elongation after aging. Thus, five and 10 phr of HBMS were definitely superior to two phr of the PBNA and DBPC controls.

Results of oxygen bomb aging are given in Table III. Again, it can be seen that five and 10 phr of HBMS gave the best aged tensile strength and elongation, indicating the outstanding antioxidant properties of this material. At 10 phr, the 2½ to 1 blend also gave properties that were quite comparable to those of HBMS and superior to those of either of the antioxidant controls.

A DeMattia Flexometer was used to determine resistance to crack growth. This test provides an index of the ability of a rubber composition to withstand dynamic flexing, such as is encountered in the flexing of an automobile tire. In comparing various compositions for this property, an effort was made to take their moduli into consideration. The reason for doing this is that a composition with a higher modulus is under greater stress during flexing, which would tend to shorten the flex life. Thus, in comparing the results for crack growth in Figure 4, only those cures were compared which had a 100 per cent modulus of 150 to 200 psi. On this basis, five phr of the HBMS gave greater resistance to crack growth than the other lignite tar materials, but its performance was inferior to those of the PBNA and DBPC controls.

The investigation revealed that all compositions containing lignite tar products stained on contact approximately equal to that of the PBNA control, although the DBPC control was appreciably better than the other antioxidants (Table IV). On the other hand, all compositions containing lignite tar products, except 10 phr of HBMS, were superior to PBNA in migration staining. Thus, these results indicate that the lignite tar materials would be no worse than PBNA in regard to staining.

The Mooney scorch data in Table IV show that HBMS significantly shortens the scorch time and may pose a problem from a processing safety viewpoint.

TABLE V—EFFECT OF ROCKDALE LIGNITE TAR MATERIALS ON HOT-AIR AGING OF SBR-1500

Antioxidant Added	Amount, phr	Cure, min at 302 F	Unaged: 100 Per Cent Modulus, psi	Unaged: 300 Per Cent Modulus, psi	Unaged: Tensile Strength, psi	Unaged: Elongation, per cent	Unaged: Hardness, Shore A-2	Aged 4 Days at 212 F: 100 Per Cent Modulus, psi	Aged 4 Days at 212 F: 300 Per Cent Modulus, psi	Aged 4 Days at 212 F: Tensile Strength, psi	Aged 4 Days at 212 F: Elongation, per cent	Aged 4 Days at 212 F: Hardness, Shore A-2	Aged 7 Days at 212 F: 100 Per Cent Modulus, psi	Aged 7 Days at 212 F: 300 Per Cent Modulus, psi	Aged 7 Days at 212 F: Tensile Strength, psi	Aged 7 Days at 212 F: Elongation, per cent	Aged 7 Days at 212 F: Hardness, Shore A-2
None	–	30	90	690	3550	740	62	900	–	1520	140	76	–	–	1060	90	80
		60	190	1290	3570	550	63	780	–	1830	160	76	1230	–	1380	110	77
PBNA	2	30	80	510	3250	780	58	920	–	1720	150	76	1200	–	1200	100	80
		60	170	1170	3340	550	61	840	–	1880	120	74	1170	–	1440	120	78
DBPC	2	30	20	210	1190	1030	56	670	–	1690	170	73	1200	–	1440	110	77
		60	190	500	2940	720	59	800	–	1330	140	76	–	–	1120	90	78
Hydrocarbon softener	2	30	70	410	2650	800	58	600	–	890	120	73	920	–	1200	110	76
		60	170	1110	2720	510	62	680	–	1420	170	75	1020	–	1490	130	78
Hydrocarbon softener	5	30	50	310	2890	850	57	550	–	1080	160	71	1090	–	1130	100	77
		60	100	760	2940	630	60	540	–	1420	170	74	980	–	1180	110	79
Hydrocarbon softener	10	30	80	330	2890	860	58	590	–	790	120	72	910	–	1190	120	77
		60	100	650	3430	700	57	450	–	1240	180	70	840	–	1320	130	76
PBNA + 1:1 blend of HBMS:HBHS	2 + 10	30	90	440	3130	790	62	570	–	1850	260	76	660	–	1970	250	78
		60	130	740	3680	680	66	390	1830	2330	340	76	550	2150	2150	300	77
PBNA + hydrocarbon softener	2 + 10	30	30	220	2570	940	53	480	–	1320	190	71	820	–	970	110	75
		60	190	510	3430	760	62	490	–	1650	220	70	730	–	1350	160	74
HBMS	2	30	130	420	3150	870	62	640	–	1560	190	75	–	–	810	80	78
		60	180	890	3590	650	64	520	–	1740	210	76	950	–	1580	140	78
HBMS	5	30	120	440	3460	800	66	590	–	1760	240	77	860	–	1890	190	78
		60	180	810	3710	670	67	430	2010	2390	340	76	680	–	2270	260	80
HBMS	10	30	140	540	3480	730	71	500	1740	2030	340	80	580	1980	1980	300	81
		60	200	760	3370	630	74	400	1600	2440	410	79	550	–	1850	260	83
3:1 HBMS:HBHS	2	30	100	420	2920	850	62	520	–	1710	230	74	920	–	1240	120	80
		60	160	880	3680	670	65	460	–	1660	230	75	730	–	1540	160	80
3:1 HBMS:HBHS	5	30	100	390	2980	830	65	610	–	1650	220	76	730	–	1490	160	78
		60	150	750	3630	690	66	440	2060	2350	320	75	680	–	1840	210	79
3:1 HBMS:HBHS	10	30	90	370	2930	810	63	420	1560	2540	420	76	540	1890	2120	340	78
		60	180	690	3700	700	72	410	1610	2670	420	79	560	2040	2990	400	83
1:1 HBMS:HBHS	2	30	80	320	2680	950	61	500	–	1330	190	73	870	–	1620	160	74
		60	130	640	3200	740	67	450	–	1930	240	74	830	–	1380	120	80
1:1 HBMS:HBHS	5	30	40	250	2260	950	55	470	1720	2020	320	71	580	–	1590	220	71
		60	110	590	3380	740	65	320	1840	2280	340	74	590	–	1710	220	79
1:1 HBMS:HBHS	10	30	80	320	2980	870	61	420	1800	1920	360	74	510	1920	2010	310	75
		60	80	510	3200	710	67	370	1530	2710	440	76	510	2010	2490	350	81
1:3 HBMS:HBHS	2	30	30	200	1210	>1100	54	300	1700	1750	310	67	510	–	940	150	74
		60	90	490	3170	760	62	410	2310	2520	310	72	820	–	1550	150	79
1:3 HBMS:HBHS	5	30	20	130	2190	1100	60	380	1680	2150	360	72	500	–	1650	260	73
		60	90	500	2960	740	65	390	1960	1960	300	73	610	–	1450	180	78
1:3 HBMS:HBHS	10	30	20	190	1910	990	64	310	1390	2210	420	73	400	1780	1950	310	75
		60	120	510	3130	750	66	330	1530	2130	380	75	470	1930	1950	310	78
HBHS	2	30	90	490	3470	820	65	720	–	1570	150	75	1170	–	1580	120	79
		60	100	1090	4100	630	66	620	–	1440	160	75	1120	–	1740	130	79
HBHS	5	30	110	400	3080	840	62	630	–	1540	190	75	980	–	1440	130	80
		60	160	950	3900	670	65	530	–	1310	170	75	890	–	1390	140	79
HBHS	10	30	170	320	2790	880	65	550	–	1230	180	74	740	–	1410	160	78
		60	140	660	3400	700	65	410	–	1690	270	75	620	–	1680	210	79
HBMS (Battelle)	5	30	40	150	2490	900	64	480	–	1790	310	75	590	–	1440	190	78
		60	160	740	3370	670	68	420	2010	2520	360	77	420	–	2000	240	79
HBHS (Battelle)	5	30	20	250	2630	890	63	590	–	900	120	74	1000	–	1400	130	77
		60	130	820	3580	660	65	520	–	1570	200	75	520	–	1570	140	80

TABLE VI—EFFECT OF ROCKDALE LIGNITE TAR MATERIALS ON OXYGEN-BOMB AGING OF SBR-1500

Antioxidant[a]	Amount Added, phr	100 Per Cent Modulus			300 Per Cent Modulus			Tensile Strength			Elongation			Hardness		
		Unaged, psi	Aged[b], psi	Per Cent Change	Unaged, psi	Aged, psi	Per Cent Change	Unaged, psi	Aged, psi	Per Cent Change	Unaged, per cent	Aged, per cent	Per Cent Change	Unaged, Shore A-2	Aged, Shore A-2	Change, points
None	–	190	430	126	1290	1640	27	3570	2400	33	550	460	16	63	70	7
PBNA	2	170	370	118	1170	1300	10	3340	1700	49	550	410	26	61	77	16
DBPC	2	190	320	68	500	1380	176	2940	2380	19	720	510	29	59	74	15
Hydrocarbon softener	2	170	350	106	1110	1520	37	2720	2050	25	510	390	24	62	78	16
Hydrocarbon softener	5	100	250	150	760	1130	49	2940	1840	37	630	500	21	60	79	19
Hydrocarbon softener	10	100	230	130	650	1120	72	3430	2710	21	700	590	16	57	73	16
PBNA + 1:1 blend of HBMS:HBHS	2 + 10	130	400	208	740	1350	82	3680	2120	42	680	470	31	66	76	10
PBNA + hydrocarbon softener	2 + 10	190	220	16	510	1090	114	3430	2240	35	760	570	25	62	68	6
HBMS	2	180	410	128	890	1700	91	3590	2880	20	650	450	31	64	75	11
HBMS	5	180	450	150	810	1560	93	3710	2520	32	670	470	30	67	77	10
HBMS	10	200	600	200	760	1630	115	3370	2330	32	630	450	29	74	81	7
3:1 HBMS:HBHS	2	160	370	131	880	1280	45	3680	2120	42	670	520	22	65	76	11
3:1 HBMS:HBHS	5	150	280	87	750	1160	55	3630	1990	45	690	470	32	66	73	7
3:1 HBMS:HBHS	10	180	410	128	690	1390	101	3700	2380	36	700	510	27	72	78	6
1:1 HBMS:HBHS	2	130	350	169	640	1520	138	3200	2610	18	740	470	37	67	75	8
1:1 HBMS:HBHS	5	110	310	182	590	1220	107	3380	2600	23	740	560	24	65	75	10
1:1 HBMS:HBHS	10	80	390	387	510	1430	180	3200	2470	23	710	480	32	67	76	9
1:3 HBMS:HBHS	2	90	510	467	490	1640	235	3170	2070	35	760	400	47	62	79	17
1:3 HBMS:HBHS	5	90	330	267	500	1210	142	2960	1800	39	740	500	33	65	77	12
1:3 HBMS:HBHS	10	120	450	275	510	1320	159	3130	2000	36	750	480	36	66	83	17
HBHS	2	180	390	117	1090	1580	45	4100	2670	35	630	480	24	66	75	9
HBHS	5	160	300	87	950	1300	37	3900	2250	42	670	500	25	65	73	8
HBHS	10	140	350	150	660	1280	94	3400	2390	30	700	530	24	65	76	11
HBMS (Battelle)	5	160	530	231	740	1750	137	3370	2440	28	670	420	37	68	82	14
HBHS (Battelle)	5	130	300	131	820	1350	65	3580	2450	32	660	490	26	66	72	7

(a) Recipe same as shown in Table 5.
(b) All aging was for 4 days at 90 C in oxygen at 300 psi. All samples were cured for 60 minutes at 302 F.

Recipe — Table V

Ingredient	Parts by Weight
SBR-1500	100
EPC black	40
Zinc oxide	5
Stearic acid	1.5
Sulfur	2
Benzothiazyl disulfide	3
Antioxidant	As shown

For example, five phr cut the scorch time from about 15 to 11 minutes, while 10 phr further pared the scorch time to seven minutes. However, a hopeful note is evident in the scorch time obtained for HBHS and its blends with HBMS. It is believed that the easier processing characteristics of hexane solubles are responsible for part of this improvement. As would be expected, the short Mooney scorch time for HBMS is also associated with a shorter △20 cure time. The plasticizing effect of the lignite tar materials is demonstrated by the fact that increasing the amount of these materials reduced the Mooney viscosity.

The antioxidant evaluations previously described in this paper were all made on fractions prepared in a small-scale pilot plant at Battelle. However, when materials became available from the much larger Rockdale pilot plant, it was felt that the performance of these should be determined and compared against similar fractions produced at Battelle. Since it is customary to add additional antioxidant to SBR compositions during the compounding, it was decided to use commercially prepared SBR for this part of the investigation. The polymer selected contained 1.1 per cent antioxidant added during manufacture.

Antioxidants are expected to have little or no effect on unaged stress-strain properties, because they are normally used in low concentrations (one to two phr). Since the lignite tar materials were investigated in concentrations up to 10 phr, an effect on unaged properties might be anticipated from plasticization and/or influence on cure rate. Table V shows that in a channel black composition the unaged properties were changed only to a limited extent by the addition of HBMS and HBHS. Modulus was lowered and a very slight increase in hardness was observed.

The results of the hot air aging study (Table V) show that all the samples containing lignite tar products, with the exception of the one containing two phr HBMS, underwent less change in average physical properties than the PBNA and DBPC control compositions. The best balance of aged properties was obtained for samples containing the highest antioxidant concentrations; that is, 10 phr of HBMS or 10 phr of the 3 to 1 blend of HBMS and HBHS. It is unusual to find that increasing the amount of antioxidant to such high levels as 10 phr will appreciably improve resistance to aging. For example, it has been reported by Shelton, Cox and Wickham *(4)* that PBNA added to SBR reached an optimum effec-

TABLE VII—EFFECT OF ROCKDALE LIGNITE TAR MATERIALS ON PHYSICAL PROPERTIES[a] OF SBR-1500

Antioxidant Added[d]	Amount, phr	Mooney Scorch and Cure Times, minutes at 302 F				Tear Strength, lb per in.	Rebound, per cent	Heat Build-Up, F	Crack Growth, 0.001 in. per kilocycle	Quality Index, per cent[b]			Contact Staining[c] (3 Hours at 175 F)	Migration Staining[c] (12 Hours at 140 F)	Permanent Set, per cent
		Δ5	Δ20	Δ35	Δ35 - Δ5					Equation (1)	Equation (2)	Avg			
None	–	11	14	15-1/2	4-1/2	270	52.0	57	4.03	105	106	106	2	1	6
PBNA	2	12-1/2	16	17	4-1/2	275	50.8	55	7.22	101	101	101	2	4	6
DBPC	2	16	21-1/2	26	10	280	48.5	64	0.55	120	114	117	2	2	5
Hydrocarbon softener	2	14	16	17-1/2	3-1/2	270	51.0	55	7.23	101	100	101	2	2	–
Hydrocarbon softener	5	15	18	20	5	260	50.3	57	4.12	105	101	103	2	2	5
Hydrocarbon softener	10	17	20	21	4	270	48.0	57	2.42	109	104	107	2	2	5
PBNA + 1:1 blend of HBMS:HBHS	2 + 10	10	12	15	5	260	46.2	63	8.05	98	95	97	3	4	7
PBNA + hydrocarbon softener	2 + 10	16	18	22	6	260	47.5	59	6.52	101	95	98	3	4	6
HBMS	2	13	16	18	5	280	49.1	62	3.80	105	103	104	2	3	6
HBMS	5	11	15	16-1/2	5-1/2	280	47.3	68	3.52	104	102	103	3	3	7
HBMS	10	8-1/2	11	12	3-1/2	270	45.5	68	10.60	94	92	93	4	3	8
3:1 HBMS:HBHS	2	14	17	19	5	270	49.3	63	3.33	105	103	104	2	2	7
3:1 HBMS:HBHS	5	11	14	16	5	265	51.5	59	2.11	110	106	108	2	2	7
3:1 HBMS:HBHS	10	9-1/2	12	13-1/2	4	240	47.6	62	10.80	96	92	94	4	2	7
1:1 HBMS:HBHS	2	12	15	17-1/2	5-1/2	250	51.5	58	9.44	98	93	96	2	2	7
1:1 HBMS:HBHS	5	12-1/2	16-1/2	19	6-1/2	240	49.6	59	7.03	99	95	97	2	1	7
1:1 HBMS:HBHS	10	11	14	15-1/2	4-1/2	240	49.4	69	6.82	98	94	96	2	1	8
1:3 HBMS:HBHS	2	14-1/2	19	21	6-1/2	250	50.5	60	6.81	99	94	97	1	2	6
1:3 HBMS:HBHS	5	13	17	20	7	240	50.6	66	5.00	101	96	99	1	2	6
1:3 HBMS:HBHS	10	12	16	18	6	240	49.1	81	6.67	95	93	94	3	1	6
HBHS	2	12	16-1/2	18	6	260	50.6	54	8.70	99	98	99	3	1	6
HBHS	5	17-1/2	19	22	4-1/2	280	49.9	60	2.89	107	106	107	2	1	6
HBHS	10	13	16-1/2	18	5	240	47.8	56	2.94	108	102	105	2	1	6
HBMS (Battelle)	5	14	16	18	4	250	48.9	77	2.23	95	95	95	3	2	6
HBHS (Battelle)	5	13	20	21-1/2	8-1/2	250	51.0	72	7.78	95	95	95	3	1	4

(a) Vulcanizate properties determined on 60-minute cure at 302 F.
(b) Calculated according to Equations (1) and (2) reported by Juve [Ind. Eng. Chem., 39, 1494 (1947); Rubber Chem. and Technol., 21, 484 (1948)].
(c) Relative degree of staining, where 1 equals least staining and 4 is maximum stain.
(d) Recipe same as shown in Table 5.

tiveness at a fairly low concentration (1.25 phr) and that additional quantities contributed only small improvements in resistance to aging. In the case of natural rubber, these same investigators found that excess antioxidant was harmful.

Oxygen bomb aging tests were also made, with results presented in Table VI. The losses experienced in stress-strain and hardness properties after oxygen aging were less than those resulting from test tube aging. Consequently, differences between antioxidants were not as great in this test. However, three were considered to be somewhat better than the others: 5 phr—HBHS; 5 phr 3:1 HBMS:HBHS; and 2 phr 1:1 HBMS:HBHS.

The results of a number of miscellaneous tests on SBR-1500 compositions containing lignite tar fractions are given in Table VII. It can be seen that the scorch time was shortened significantly by 10 phr of either HBMS or the 3:1 HBMS:HBHS blend. This is a repetition of the scorch problem previously encountered and points to the need for avoiding high loadings of HBMS, unless a scorchy stock can be tolerated in the interests of obtaining better aging characteristics. Of course, steps might be taken to offset this deficiency by employing a retarder or by modifying the curing system. Another option would be to use HBHS alone or in other ratios with HBMS, as the trend in this case is toward extending the scorch time to a safer range.

The data on tear strength show that HBMS used alone had essentially no effect on this property. However, other compositions had up to 10 per cent less tear strength than the controls. Most plasticizers also tend to reduce tear strength, particularly at higher loading levels. Since the stress-strain and hardness data have shown that HBHS is a better plasticizer than HBMS, this may tie in with the greater loss of tear strength with HBHS than with HBMS. However, the extent of the loss is not considered serious, and could probably be brought back in line by appropriate use of reinforcing filler materials.

Two properties that were not influenced to any great extent by the lignite tar materials are rebound and permanent set. There is a trend for rebound to fall off to a small extent with increased loadings of these materials, but it is in the same order as that found for the hydrocarbon softener control and apparently can be attributed to plasticization.

Crack growth and heat build-up will be discussed together, since they are related and both are affected significantly by the modulus of the rubber composition. Crack growth and heat build-up are opposite properties, and improvement in one usually means an impairment in the other. Low modulus stocks

TABLE VIII—SUMMARY OF EVALUATION OF ROCKDALE LIGNITE TAR MATERIALS IN SBR-1500[a]

Antioxidant Added[b]	Amount, phr	Scorch Time	Cure Time	Hot-Air Aging	Oxygen-Bomb Aging	Rebound	Heat Build-Up	Crack Growth	Quality Index	Tear Strength	Migration Staining	Contact Staining	Permanent Set
None	–	–	0	0	+	0	0	0	0	–	+	0	0
PBNA	2	0	0	0	0	0	0	0	0	0	0	0	0
DBPC	2	++	–	0	+	0	0	+	+	0	+	0	0
Hydrocarbon softener	2	+	0	0	+	0	0	0	0	0	+	0	0
Hydrocarbon softener	5	+	0	0	+	0	0	0	0	–	+	0	0
Hydrocarbon softener	10	++	–	0	+	0	0	+	0	0	+	0	0
PBNA + 1:1 blend of HBMS:HBHS	2 + 10	–	0	0	–	0	0	–	0	–	0	–	0
PBNA + hydrocarbon softener	2 + 10	++	–	0	+	0	0	0	0	–	0	–	0
HBMS	2	0	0	0	+	0	–	+	0	0	+	0	0
HBMS	5	–	0	+	+	0	–	+	0	0	+	–	0
HBMS	10	–	0	++	+	0	0	–	0	0	+	–	0
3:1 HBMS:HBHS	2	+	0	+	+	0	0	+	0	0	+	0	0
3:1 HBMS:HBHS	5	–	0	+	++	0	0	+	0	–	+	0	0
3:1 HBMS:HBHS	10	–	0	++	++	0	0	–	0	–	+	–	0
1:1 HBMS:HBHS	2	0	0	+	++	0	0	–	0	–	+	0	0
1:1 HBMS:HBHS	5	0	–	+	+	0	0	0	0	–	+	0	0
1:1 HBMS:HBHS	10	–	0	+	+	0	–	0	0	–	+	0	0
1:3 HBMS:HBHS	2	++	–	+	+	0	0	0	0	–	+	+	0
1:3 HBMS:HBHS	5	0	–	+	+	0	–	+	0	–	+	+	0
1:3 HBMS:HBHS	10	0	0	+	+	0	–	0	0	–	+	–	0
HBHS	2	0	0	+	+	0	0	–	0	–	+	–	0
HBHS	5	+	–	+	++	0	0	+	0	–	+	0	0
HBHS	10	0	0	+	+	0	0	+	0	–	+	0	0
HBMS (Battelle)	5	+	0	+	+	0	–	0	0	–	+	–	0
HBHS (Battelle)	5	0	–	+	+	0	–	0	0	–	+	–	0

(a) ++ = much better than control with PBNA added.
+ = better than control with PBNA added.
– = poorer than control with PBNA added.
0 = equal to control with PBNA added.

(b) Recipe same as shown in Table 5.

tend to have less crack growth, whereas high modulus stocks tend to have lower heat build-up. In compounding, an effort is made to obtain the best balance of these two properties. This balance was expressed by Juve *(3)* as the quality index, described in detail earlier in this paper.

Most of the antioxidants had little or no effect on the heat build-up of the compositions. The significant exceptions to this are the compositions containing 10 phr of 1:3 HBMS:HBHS and the two containing HBMS and HBHS prepared at Battelle. With these materials a heat build-up of 15° to 25° F. more than the control containing PBNA was found, although less than this difference was noted when compared to DBPC. The crack growth data show a range of 0.55 to 10.8 in 0.001 inch per kilocycle. Although the higher heat build-up is objectionable, it can be noted that the specimens having low crack growth generally have low modulus.

Quality index results were calculated from each of Juve's empirical equations and the average of the two. The average results for the compositions containing lignite tar products ranged from 108 (5 phr 3:1 HBMS:HBHS) to 93 (10 phr HBMS), while the controls containing PBNA and DBPC were calculated to be 101 and 117, respectively. Although no information is available on how much difference in quality index is significant, it will be noted the differences as large as 4 to 6 were obtained for one sample between the two methods of calculation. Since this is more than half as great as the maximum difference between lignite tar products and the PBNA control, the quality index obtained with the lignite tar products is not significantly different from that obtained with PBNA. It can also be noted that the sample containing added PBNA was slightly poorer than when no PBNA was added.

Contact staining comes from direct contact between rubber and a non-rubber surface, while migration stain develops when the stain progresses beyond the point of direct contact. Since SBR-1500 contains a staining-type antioxidant, it was expected that it would be possible to determine only whether staining was more severe than the control samples. Metal panels painted with a white lacquer were held in contact with the rubber specimens in an oven for three hours at 175° F. and examined for contact staining. Observation of these revealed that the samples containing two phr of added PBNA or DBPC stained no more than the control containing only the antioxidant added originally in the manufacture of the rubber. However, nine samples stained more than these controls, with

TABLE IX—EFFECT OF ROCKDALE LIGNITE TAR MATERIALS AS ANTIOXIDANTS IN SBR-1500

Antioxidant Added	Amount, phr	Mooney Scorch and Cure Time, minutes at 302 F				Cure, min at 293 F	Unaged				Aged 7 Days at 212 F			
		Δ5	Δ20	Δ35	Δ35–Δ5		100 Per Cent Modulus, psi	Tensile Strength, psi	Elongation, per cent	Hardness, Shore A-2	100 Per Cent Modulus, psi	Tensile Strength, psi	Elongation, per cent	Hardness, Shore A-2
None	–	5 1/2	6 1/2	7 1/2	2	15	90	2920	760	61	450	2120	250	71
						30	170	3680	600	70	470	2950	300	72
						45	200	3510	480	66	570	2500	240	72
						60	250	3140	400	66	530	2410	240	72
PBNA	2	7	8	9	2	15	80	2920	760	61	460	2580	260	71
						30	170	3710	540	67	430	2990	290	72
						45	190	3870	520	65	520	3140	300	72
						60	280	3200	400	65	540	3300	300	71
DBPC	2	7	11	13 1/2	6 1/2	15	20	550	820	57	400	3210	350	70
						30	100	2960	710	65	370	2340	280	70
						45	100	3190	620	63	460	2200	270	70
						60	190	3540	530	65	450	2190	240	70
HBMS	2	6	8	8 1/2	2 1/2	15	60	3000	800	63	420	3000	320	71
						30	140	3940	670	70	380	3520	320	71
						45	180	3870	560	67	450	3500	350	73
						60	230	3210	450	66	490	3330	330	72
HBMS	5	5	6	6 1/2	1 1/2	15	100	3310	720	62	390	3340	430	73
						30	160	3750	630	68	430	3480	420	73
						45	195	3850	610	69	410	3280	410	73
						60	200	3680	570	68	360	3500	430	73
HBMS	10	4	4 1/2	5 1/2	1 1/2	15	110	3690	750	65	320	3510	490	72
						30	120	3600	660	68	350	3380	480	73
						45	170	3630	650	65	370	3650	520	73
						60	190	3610	620	66	360	3550	510	72
HBHS	2	6	7 1/2	8 1/2	2 1/2	15	80	2570	810	60	470	2600	260	71
						30	100	3450	600	67	470	2940	320	71
						45	170	3380	500	65	490	2760	280	72
						60	260	3510	490	65	480	2840	300	72
HBHS	5	6	8	9 1/2	3 1/2	15	80	2500	900	59	400	2740	320	70
						30	90	3590	700	65	390	3460	410	70
						45	130	3690	630	63	410	3230	370	70
						60	200	3480	550	64	410	2710	320	70
HBHS	10	6	8	9	3	15	60	3020	900	58	290	3200	460	69
						30	90	3790	730	65	330	3200	450	69
						45	110	3680	680	62	310	3140	450	70
						60	170	3880	630	64	300	3380	470	70

the worst offender being high concentrations of HBMS. It can also be noted that specimens containing two and five phr of the 1:3 HBMS:HBHS blend stained less than did the controls. However, the slight differences were not considered significant.

Results from migration staining varied between the control containing no added antioxidant and the one containing PBNA, rated as 1 (least staining) and 4 (most staining), respectively. HBHS (rated 2 when used alone or in high proportions with HBMS) was better than PBNA and equal to DBPC, whereas HBMS (rated 3) was only slightly better than PBNA and poorer than DBPC. Significantly, migration staining did not tend to increase as the amounts of lignite tar materials became greater.

The tests for both contact and migration staining indicate that HBHS is definitely better than HBMS. However, even HBHS could not be used for non-

TABLE X—EVALUATION OF LIGNITE TAR MATERIALS AS PLASTICIZERS IN SBR-1500

Plasticizer	Phr	Cure, min. at 302°F.	300 Per Cent Modulus, psi	Tensile Strength, psi	Elongation, per cent	Hardness Shore A-2	ML-4 at 212°F.
None	—	15	480	2000	830	53	65
	—	30	1250	3100	630	64	
	—	60	1760	2750	460	66	
Hydrocarbon softener	10	15	110	1430	1160	48	50
	10	30	590	2880	840	56	
	10	60	950	2870	680	58	
Hydrocarbon softener	20	15	130	—	—	48	41.5
	20	30	490	3530	870	55	
	20	60	810	3350	710	58	
Hydrocarbon softener	30	15	110	—	—	46	34.5
	30	30	370	3310	950	51	
	30	60	600	3490	800	56	
MBHS	10	15	210	1510	1020	46	42
	10	30	790	2690	740	53	
	10	60	1090	2480	580	58	
MBHS	20	15	220	2100	1000	44	32.5
	20	30	700	3240	760	52	
	20	60	880	3430	680	56	
MBHS	30	15	170	—	—	41	24.5
	30	30	490	3030	820	47	
	30	60	650	3030	730	52	
HBHS	10	15	220	—	—	49	51
	10	30	510	2750	830	56	
	10	60	900	3130	710	62	
HBHS	20	15	210	—	—	58	48
	20	30	610	4090	810	64	
	20	60	870	3810	690	65	
HBHS	30	15	300	2690	940	57	39.5
	30	30	570	3380	780	62	
	30	60	660	3580	740	63	

Recipe — Table IX

Ingredient	Parts by Weight
SBR-1500	100
HAF Black	40
Zinc oxide	5
Stearic acid	1.5
Sulfur	1.75
Benzothiazyl disulfide	0.8
Tetramethyl thiuram disulfide	0.15

Recipe — Table X

Ingredient	Parts by Weight
SBR-1500	100
EPC black	40
Zinc oxide	5
Stearic acid	1
Benzothiazyl disulfide	3
Sulfur	2
Plasticizer	As shown

staining applications. Staining from products made at Rockdale were slightly less than from those prepared at Battelle, presumably because the Rockdale materials were deliberately made with slightly higher softening points.

Table VIII summarizes the evaluation of Rockdale lignite tar materials in commercially prepared SBR-1500 filled with EPC black. It can be seen that on an over-all basis, the performance of the lignite tar materials was fully comparable to those of PBNA and DBPC. It is felt that the optimum balance of properties, i.e., good aging, long scorch time, and low staining is obtained when using two to five phr of a 3:1 blend of HBMS and HBHS.

Previous data in this paper were limited to compositions reinforced with EPC black. Because of the importance of furnace blacks in the rubber industry, and the fact that scorching is more of a problem with furnace blacks than with channel blacks, the use of lignite tar materials with HAF blacks was investigated. Data in Table IX present the results of this study and indicate that the lignite tar materials gave essentially the same relative performance with one black as with the other. Just as in the case of the channel black stocks, the use of 5 and 10 phr of HBMS significantly cut the scorch time of the furnace black stocks, while HBHS had no effect on this property. As before, it is anticipated that changes could be made in the curing system to compensate for the shorter scorch time.

The furnace black results also disclose that the

lignite tar products have little effect on unaged properties, except to decrease the modulus. This was anticipated in view of the plasticizing effect of the lignite tar materials. The data for aging reveal a maximum retention of rubber physical properties when using 10 phr of HBMS. However, lower concentrations of HBMS (two and five phr) and high concentrations of HBHS were equal or superior to PBNA or DBPC in maintaining aged physical properties.

In summary, these results indicate comparable results with lignite tar products whether using furnace or channel blacks. For the best balance of properties, 2 to 5 phr of HBMS, or a blend of HBMS and HBHS, is recommended.

Evaluation as Plasticizers in SBR

Hexane soluble fractions produced at Battelle were also explored at plasticizer concentration levels of 10, 20, and 30 phr. The two products investigated were the high and medium boiling fractions (HBHS and MBHS). Both of these were fully compatible in these amounts and incorporated easily into SBR-1500. The experimental results, presented in Table X, indicate that their general performance straddled that obtained for the hydrocarbon softener control, with MBHS being slightly more efficient and HBHS being slightly less efficient in plasticizing action than the control. Presumably, a blend of HBHS and MBHS, or a fraction prepared with intermediate physical properties, would give essentially the same results as those for the control. The efficiency of plasticizers can be judged by their ability to reduce Mooney viscosity, modulus, and hardness, and increase the elongation. One would expect that as the amount of plasticizer was increased, there would also be a noticeable decline in tensile strength. However, a favorable retention of tensile strength was experienced for the lignite tar materials and also for the control. Thus, the hexane soluble fractions merit consideration as plasticizers and possibly as oil extenders for SBR. A study is currently being made to investigate this latter possibility.

Plasticizers for Neoprene WRT

A program was also carried out in which the same two hexane soluble fractions, HBHS and MBHS, were tried out in Neoprene WRT. The elongation results given in Table XI indicate that in this rubber, MBHS was not quite as efficient a plasticizer as the hydrocarbon softener and HBHS was considerably less efficient than the same control. This would mean, of course, that more of these lignite tar fractions would be needed to obtain the same elongation. At the same time, MBHS was more effective in reducing hardness and Mooney viscosity than the hydrocarbon softener and almost as effective as butyl oleate in influencing these same properties. From the Mooney viscosity results, one would expect MBHS to assist in processing.

The manner in which lignite tar fractions influence the age resistance of neoprene, which inherently has excellent aging properties, would be an important factor in determining their possible success as plasticizers. Of the two compositions containing hexane solubles, the one containing HBHS exhibited the least change in physical properties after aging. In this regard, it compares favorably with the two controls. MBHS also gave stocks that were quite good at retaining tensile strength and elongation, but these stocks increased in hardness during aging more than did the other compounds. The reason for such large changes in hardness is not fully understood.

In addition to aging, a number of other tests were conducted to characterize the performance of the lignite tar fractions in neoprene. One of these relates to the resistance of compositions containing these materials to scorch during processing. The Mooney scorch date indicate that HBHS and MBHS are about equal to the controls in contributing to processing safety. The compression set values also indicate similar performance for the lignite tar materials and the controls. The tear strength of the base recipe was considerably improved by the addition of HBHS. The hydrocarbon softener also improved this property, but the ester-type plasticizer and MBHS caused this property to decline.

The shrinkage of a composition, due to loss of highly volatile components, is sometimes a problem. In this investigation, the loss in weight was greatest for the compositions containing butyl oleate and MBHS. As a result, HBHS would probably be preferred for applications where volatility may be a problem.

The brittle point data show that the best low-temperature plasticizer was butyl oleate. However, MBHS is shown to be better than the hydrocarbon softener and it could be used for all but the most demanding low-temperature applications.

Plasticizers in Nitrile Rubber

The performance of hexane solubles in a medium nitrile rubber followed much the same pattern as previously described for their action in Neoprene WRT. The results of the study of the lignite tar fractions in nitrile rubber are presented in Table XII. In general, the data show that MBHS reduced the plasticity of the base recipe to about the same extent as that accomplished with dioctyl sebacate (DOS) and the hydrocarbon softener. It also had about the same effect on the un-aged physical properties of the

Recipe — Table XI

Ingredient	Parts by Weight
Neoprene WRT	100
SRF black	70
Phenyl-beta-naphthylamine	2
Stearic acid	0.5
Magnesium oxide	4
Zinc oxide	5
Na-22	0.5
Plasticizer	As shown

Table XI—Evaluation of Hexane Solubles as Plasticizers for Neoprene WRT

Plasticizer Added	Phr	Cure, min at 307 F	Unaged: 100 Per Cent Modulus, psi	Unaged: 300 Per Cent Modulus, psi	Unaged: Tensile Strength, psi	Unaged: Elongation, per cent	Unaged: Hardness, Shore A	Aged 4 Days at 212 F: 100 Per Cent Modulus, psi	Aged 4 Days at 212 F: Tensile Strength, psi	Aged 4 Days at 212 F: Elongation, per cent	Aged 4 Days at 212 F: Hardness, Shore A	Aged 7 Days at 212 F: 100 Per Cent Modulus, psi	Aged 7 Days at 212 F: Tensile Strength, psi	Aged 7 Days at 212 F: Elongation, per cent	Aged 7 Days at 212 F: Hardness, Shore A	Mooney Viscosity, ML-4 at 212 F	Mooney Scorch at 280 F, SR: Minimum Viscosity	Mooney Scorch at 280 F, SR: Δ5, minutes	Mooney Scorch at 280 F, SR: Δ20, minutes	Compression Set[a] 22 Hr at 158 F (Method B)	Brittle Point[a], C	Tear Strength[a] (Die C), lb/in.	Plasticizer Volatility, per cent weight loss
None	–	20	1120	–	3280	230	78	1400	3120	200	81	1520	3020	180	82	91-1/2	42-1/2	3-1/2	5-1/2				
	–	30	1210	–	3400	210	79	1300	3050	200	81	1410	3180	190	82								
	–	40	1210	–	2980	190	80	1420	2900	180	82	1450	2650	170	82					9	–36.8	188	0.68
HBHS	10	20	700	2480	2500	300	71	900	2580	300	77	1000	2500	270	79	80	33-1/2	3-1/2	6				
	–	30	700	–	2500	280	72	900	2600	280	78	1000	2480	280	79								
	–	40	750	–	2470	270	72	900	2510	280	79	920	2500	270	79					10	–32	220	0.80
HBHS	20	20	410	1800	2250	460	67	610	2160	370	74	750	2110	370	77	54-1/2	18	5	7-1/2				
	–	30	490	1990	2300	410	68	610	2250	390	76	810	2210	340	77								
	–	40	410	1870	2120	450	68	600	2110	400	77	780	2120	340	77					10	–29	253	0.80
HBHS	30	20	220	780	2000	620	61	420	2000	550	72	510	1850	490	74	45-1/2	14	5-1/2	8				
	–	30	250	1330	2100	620	62	400	2010	560	72	540	1900	500	74								
	–	40	290	1390	2100	600	62	430	2020	510	73	510	1910	450	74					13.5	–27	253	1.6
MBHS	10	20	460	2500	2600	310	65	780	2720	270	73	1050	2800	240	78	69	25-1/2	4	7-1/2				
	–	30	550	–	2580	270	66	720	2680	260	73	1080	2800	230	78								
	–	40	720	–	2560	240	69	920	2810	230	76	1080	2800	210	81					8.2	–37	208	3.3
MBHS	20	20	220	1720	2300	370	56	450	2480	340	67	850	2510	260	78	40	14-1/2	4-1/2	9				
	–	30	280	1990	2350	330	57	410	2480	330	68	850	2750	280	77								
	–	40	410	–	2400	280	63	510	2510	300	72	930	2550	240	81					10.7	–40	173	3.2
MBHS	30	20	200	1650	2300	400	51	260	2250	370	63	850	2550	270	77	16-3/4	9-1/2	6	9				
	–	30	220	1920	2350	350	53	280	2300	350	64	810	2600	270	77								
	–	40	240	1860	2200	340	55	380	2120	320	67	870	2500	260	80					11.8	–40	150	5.5
Hydrocarbon softener	10	20	500	2200	2400	360	72	710	2500	310	74	820	2300	270	75	62-3/4	25-1/2	4-1/2	6-3/4				
	–	30	620	2400	2510	340	72	680	2480	310	74	820	2490	280	75								
	–	40	590	2380	2500	350	72	690	2520	300	74	820	2350	280	75					10.0	–36	203	0.8
Hydrocarbon softener	20	20	300	1600	2090	520	64	390	2090	460	67	500	2010	400	68	41-1/2	19	6	8-1/2				
	–	30	350	1680	2120	460	65	390	2020	440	68	480	2080	410	69								
	–	40	320	1730	2200	460	64	440	2090	400	68	460	2080	430	68					10.5	–31	219	2.28
Hydrocarbon softener	30	20	190	1100	1900	650	55	250	1880	580	61	310	2300	570	61	24-1/2	7	9-1/2	12				
	–	30	200	750	1950	600	56	280	1950	560	61	300	2300	500	62								
	–	40	200	810	1990	550	57	280	1950	550	61	290	2310	510	61					11.4	–33	207	1.6
Butyl oleate	10	20	500	–	2790	270	68	660	2780	250	72	880	2880	250	75	44	23-1/4	4	7				
	–	30	600	–	2500	230	69	800	2810	240	73	920	2750	240	76								
	–	40	620	–	2500	230	70	790	2670	230	73	850	2750	240	76					8.8	–45	153	3.7
Butyl oleate	20	20	210	2000	2120	310	59	390	2320	310	63	590	2400	270	70	22-1/2	10-1/2	5-1/2	9				
	–	30	300	2300	2400	300	60	390	2480	300	63	620	2620	270	70								
	–	40	260	–	2200	260	62	400	2220	260	64	580	2600	290	71					9.8	–56	132	6.0
Butyl oleate	30	20	60	1040	1800	410	49	120	2000	400	53	310	2300	380	62	14	10-1/2	5-1/2	10				
	–	30	120	1420	2050	370	51	180	1950	370	53	380	2310	330	65								
	–	40	120	1460	2080	350	51	150	2050	330	55	410	2350	320	67					10.4	–60	112	4.1

(a) Results for optimum cure.

Table XII—Evaluation of Hexane Solubles as Plasticizers for Nitrile Rubber

Plasticizer Added	Phr	Cure, min at 287 F	Unaged: 100 Per Cent Modulus, psi	Unaged: 300 Per Cent Modulus, psi	Unaged: Tensile Strength, psi	Unaged: Elongation, per cent	Unaged: Hardness, Shore A	Aged 4 Days at 212 F: 100 Per Cent Modulus, psi	Aged 4 Days at 212 F: Tensile Strength, psi	Aged 4 Days at 212 F: Elongation, per cent	Aged 4 Days at 212 F: Hardness, Shore A	Aged 7 Days at 212 F: 100 Per Cent Modulus, psi	Aged 7 Days at 212 F: Tensile Strength, psi	Aged 7 Days at 212 F: Elongation, per cent	Aged 7 Days at 212 F: Hardness, Shore A	Mooney Viscosity, ML-4 at 212 F	Mooney Scorch at 280 F, SR: Minimum Viscosity	Mooney Scorch at 280 F, SR: Δ5, minutes	Mooney Scorch at 280 F, SR: Δ20, minutes	Compression Set[a] 22 Hr at 158 F (Method B)	Brittle Point[a], C	Tear Strength[a] (Die C), lb/in.	Plasticizer Volatility, per cent weight loss
None	–	15	460	2150	2650	370	74	1350	2850	190	82	1600	3000	150	84	82	33-3/4	6-1/4	7-3/4				
	–	30	500	2300	2620	370	75	1100	2790	230	82	1450	2900	180	84								
	–	60	500	2410	2800	380	76	950	3000	320	80	1300	2900	200	82					14	–44	248	0.53
HBHS	10	15	290	1320	2350	560	70	810	2670	230	78	1150	2790	270	81	63	27-1/2	6-1/2	7-1/2				
	–	30	320	1570	2410	500	71	640	2570	360	78	1000	2700	280	82								
	–	60	300	1600	2510	520	71	610	2580	380	78	910	2600	290	80					16	–37	243	0.74
HBHS	20	15	200	980	2110	650	68	600	2590	410	77	850	2520	360	80	47-1/2	16-1/2	5-1/4	7				
	–	30	200	1050	2210	630	68	500	2450	450	76	890	2500	330	80								
	–	60	210	1180	2340	640	68	450	2480	480	74	850	2400	300	80					19.9	–33	230	0.74
HBHS	30	15	120	800	1850	710	65	450	2450	480	73	850	2300	320	78	39	16-1/2	4-1/2	5-3/4				
	–	30	160	750	2000	700	67	400	2380	500	73	800	2380	360	78								
	–	60	190	750	2100	700	67	440	2340	530	74	750	2320	350	79					25	–29	213	1.73
MBHS	10	15	220	1370	2290	540	67	1050	2710	230	80	1470	2860	190	83	57-1/2	24	7	8-1/4				
	–	30	280	810	2390	500	67	900	2850	280	80	1200	2860	240	82								
	–	60	280	1600	2390	480	67	800	2620	270	79	1050	2860	250	80					15.2	–40.2	213	3.83
MBHS	20	15	120	800	1700	570	58	900	2590	270	80	1120	2670	230	82	40	19	5	7				
	–	30	140	920	1810	550	59	800	2610	330	78	1050	2670	250	82								
	–	60	150	950	1910	570	60	580	2490	360	78	890	2450	250	81					22.5	–40	181	5.34
MBHS	30	15	80	500	1300	610	52	720	2440	320	76	990	2550	250	82	25-1/2	8-3/4	6	8				
	–	30	90	550	1470	610	52	550	2300	360	77	900	2500	260	82								
	–	60	90	610	1520	600	52	470	2270	410	76	870	2510	320	80					25.3	–41	157	5.61
DOS[f]	10	15	210	1320	2250	500	65	900	2870	260	76	1050	2780	210	78	53-1/2	22-1/2	8-1/2	10				
	–	30	260	1500	2300	450	55	700	2770	300	74	980	2710	220	77								
	–	60	260	1650	2400	450	67	520	2650	310	73	790	2660	250	76					14.3	–51	205	2.98
DOS	20	15	110	900	1800	540	57	450	2510	310	68	750	2400	220	71	34	14-3/4	7-1/2	9				
	–	30	120	1100	2150	530	57	380	2510	360	66	700	2500	260	70								
	–	60	130	1180	2250	510	58	280	2350	380	64	550	2400	270	69					14.5	–57	171	1.98
DOS	30	15	40	450	1300	600	47	280	1920	300	61	500	2120	230	67	21-3/4	10-1/2	10	11-1/2				
	–	30	60	650	1740	590	49	210	2200	360	60	450	2230	260	66								
	–	60	80	710	1800	560	51	190	2210	390	58	400	2120	280	64					17.5	–61	151	1.98
Hydrocarbon softener	10	15	210	1680	2180	570	68	710	2540	310	74	1050	2650	240	78	59	19-1/2	7-3/4	9-3/4				
	–	30	300	1600	2380	520	69	540	2600	400	73	950	2680	210	77								
	–	60	260	1500	2400	530	69	490	2610	400	72	820	2580	310	76					15	–39.6	219	1.08
Hydrocarbon softener	20	15	150	800	1800	640	59	480	2260	350	69	750	2350	300	73	46	18-1/2	8	9-1/4				
	–	30	140	870	1900	610	61	450	2300	410	68	720	2440	340	73								
	–	60	180	960	2020	620	62	390	2220	430	67	500	2310	380	71					19.8	–37.5	210	1.34
Hydrocarbon softener	30	15	90	500	1490	750	56	370	2190	420	67	510	2270	360	71	33-1/2	14-1/2	8	10-1/2				
	–	30	90	530	1680	730	57	300	2150	480	66	420	2200	410	70								
	–	60	110	640	1790	700	58	250	2020	510	65	390	2100	450	69					24.3	–31.0	193	1.77

(a) Results for optimum cure.

rubber. While HBHS was not as efficient a plasticizer as MBHS, it appears likely that larger amounts of HBHS would produce similar effects. Thus, about 15 phr of HBHS would probably be equivalent to 10 phr of either MBHS or DOS. An unusual characteristic of HBMS is that even 30 phr of the material reduced the unaged hardness less than 10 points. This may be an advantage for certain products.

The percentage change in the physical properties of the nitrile rubber compositions after aging was similar for compositions containing MBHS, HBHS, and the two controls. However, the hydrocarbon softener had the advantage in that its compositions increased much less in modulus and hardness during aging.

The data demonstrate that HBHS tends to shorten the scorch time of the base recipe, especially at 30 phr. While MBHS was better in this regard, it was inferior to the controls, which actually extended the scorch time. Hence, in using hexane solubles in nitrile rubber compositions, adjustments might need to be made in the curing system to bring scorch back in line.

Tear strength in the base recipe was only slightly reduced by the addition of HBHS, in contrast to the lower values shown for the compositions containing the two controls and the MBHS. Thus, HBHS could be used to obtain higher tear strength in nitrile rubber compositions.

The hydrocarbon softener and hexane solubles were ineffective in lowering the brittle point of nitrile rubber. This rules out the possibility of replacing ester plasticizers with lignite tar fractions for an aircraft requirement of —54° C., although MBHS might be used to meet an automotive requirement of —40° C. It may also be feasible to blend HBHS or MBHS with an efficient low-temperature plasticizer to meet a given specification.

MBHS may be considered to be a better plasticizer for nitrile rubber than the hydrocarbon softener, except for the disadvantage of promoting an excessive increase in modulus and hardness during aging. Where this effect is critical, a blend of MBHS with other plasticizers may be needed. HBHS might be used as the sole plasticizer to achieve good tear strength, or it could also be used with other plasticizers, including MBHS.

Processing and Compatibility

The lignite tar materials were found to process satisfactorily in the laboratory. Some difficulties were encountered with the Battelle-prepared HBMS, due to the sticky nature of this fraction, but this was partly overcome in the Rockdale product by making a material with a slightly higher softening point. All of the hexane soluble fractions and blends of methanol solubles with hexane solubles processed more easily than HBMS alone.

HBMS and HBHS from Rockdale were produced with ring and ball softening points of 48° C., and 60° to 70° C., respectively. These could be broken into small pieces and weighed as a solid, or heated to temperatures about 20° C. above their softening points and handled as liquids. Both of these fractions and their blends incorporated more readily into rubber than their Battelle-prepared counterparts.

All of the studies made with lignite tar fractions indicated that these materials had a high degree of compatibility with rubber. Even using up to 30 phr of the hexane soluble fractions in SBR, neoprene, and nitrile rubber, there was no evidence of sweat-out. In the cases of neoprene and nitrile rubber, there was some evidence of bloom on the surface, but the extent of this exudation did not appear to increase with increase in concentration level. This is in contrast to the hydrocarbon softener control, which produced neoprene and nitrile rubber compositions that become oily on the surface after a few days shelf aging. Compatibility with SBR, as expected, was much better than with the oil resistant rubbers.

Recipe — Table XII

Ingredient	Parts by Weight
Nitrile rubber	100
SRF black	75
Zinc oxide	5
Stearic acid	1.5
Benzothiazyl disulfide	1.5
Sulfur	1.5
B-L-E antioxidant	1.5
Plasticizer	As shown

Summary and Conclusions

Potentially low-cost lignite tar fractions, produced by extraction and distillation procedures, were investigated as antioxidants for natural and SBR rubbers and as plasticizers for SBR, neoprene, and nitrile rubbers. High-boiling methanol solubles (HBMS), high-boiling hexane solubles (HBHS), and blends of these were found to have antioxidant properties fully comparable to those of phenyl-beta-naphthylamine or di-tert-butyl paracresol. HBHS and a medium-boiling hexane soluble fraction (MBHS) were found to have plasticizing properties similar to those of a commercial hydrocarbon-type softener. The best balance of antioxidant properties was obtained with blends of HBMS and HBHS, while blends of HBHS and MBHS appear to offer the greatest promise as plasticizers.

Acknowledgment

The authors wish to thank the Texas Power and Light Company and the Aluminum Company of America for sponsoring this research and for their permission to release this information.

Literature References

(1) Batchelder, H. R., Filbert, R. B., Jr., and Mink, W. H., *Ind. Eng. Chem.*, Vol. 52, p. 131 (1960).

(2) Kahler, E. J., Rowlands, D. C., Brewer, J., Powell, W. H., and Ellis, W. C., *J. Chem. Eng. Data*, Vol. 5, p. 94 (1960).

(3) Juve, A. E., *Ind. Eng. Chem.*, Vol. 39, p. 1494 (1947); *Rubber Chem. Tech.*, Vol. 21, p. 484 (1948).

(4) Shelton, J. R., Cox, W. L., and Wickham, W. T., *Ind. Eng. Chem.*, Vol. 47, p. 2559 (1955).

Abrasion Testing on a Modified DuPont-Grasselli Abrader

By Z. RIGBI

Rubber Research Association, Haifa, Israel*

ALTHOUGH the use of the DuPont-Grasselli Abrader is specified in many standards, including ASTM, BSI, GOST and ISO, and many refinements have been introduced in the operating technique, it suffers from many disadvantages and shows little correlation with tread wear ratings. Improvements in uniformity of test results have resulted from the standardization of the abrasive surface, as in the latest edition of the relevant British Standard *(1);* the use of talc, chalk or other mild abrasive to do away with the drop of abrasivity of the surface due to sticky detritus which may be formed *(7);* the extraction of the samples with acetone *(9);* comparison with the wear of a standard rubber sample[1]; rotation of the order of samples in a series and attention to the "life" of the abrasive[2]; and the specification of samples with a much smaller height than heretofore *(8).*

In spite of all these improvements, little reliability is placed by tire manufacturers on the DuPont abrader because it has not been possible to substantiate claims made for correlation with tread wear *(6),* even when small compounding variations are considered. However, the test is said to be quite useful for studying heel stocks, and possibly stocks used for solid tires.

It will be seen that the mechanism of abrasion as it occurs in the DuPont machine does not resemble that occurring in the tire when running on the road. Somewhat closer to real conditions is the abrasion obtained in the Akron Machine *(2),* the Vogt abrader *(13)* or the Lambourn machine *(5),* the latter being capable of supplying very much more information on tread wear than the others, although fully satisfactory correlation has not apparently been realized. This is possibly due to the recently discovered fact that the abrasion life of the tire is as much a function of the hysteresis of tire casing *(11)* and its elasticity *(10)* as it is of the friability of the surface, which is the property probably measured by the Russian modification *(8)* of the standard test. This term is used advisedly in order to differentiate between the gross abrasion of the wheel or test piece and the resistance to abrasion of the surface itself. Also, the abrasion resistance of one material may be greater or smaller than that of another, depending upon the severity of applied abrasion.

Machine Modification

In an attempt to surmount the difficulties, a modification to the standard DuPont machine was designed which is believed to be an improvement upon the original in the following respects:

(1) Instead of using stationary samples, these would rotate and thus approach more closely the state of affairs obtaining in a tire.

(2) Slip could be introduced in varying degrees, not by the use of a brake (as in the Lambourn machine) but by varying the angle of attack (as is possible in the Akron machine, although this is rarely done). At the same time, a slip angle would introduce a "crab walk" [*viz.* Shallamach *(10)*] which is an important feature of tire abrasion.

(3) The power of abrasion at varying rates of slip (i.e., varying slip angles) could be studied. In this, the advantage of the Lambourn machine would be coupled with the simplicity of the arrangements of the Akron machine, and the simple mechanical construction of the DuPont machine.

Some experiments were carried out, but the modification did not appear too hopeful till the publication by Gelinas and Storey *(4)* demonstrated its weak points. The modification in its final form will now

[1] Comparison of rate of abrasion to that of a standard sample has been adopted in many specifications. The standards are not always similar in character.

[2] Although the same paper is specified in BS-903 and ISO-R-33, the useful life is said to be 50 minutes in the former specification and 6 hours in the latter. It appears that this point requires elucidation.

* Dr Rigbi is now affiliated with Ceasarea Polymer Corp., Ceasarea, Israel.

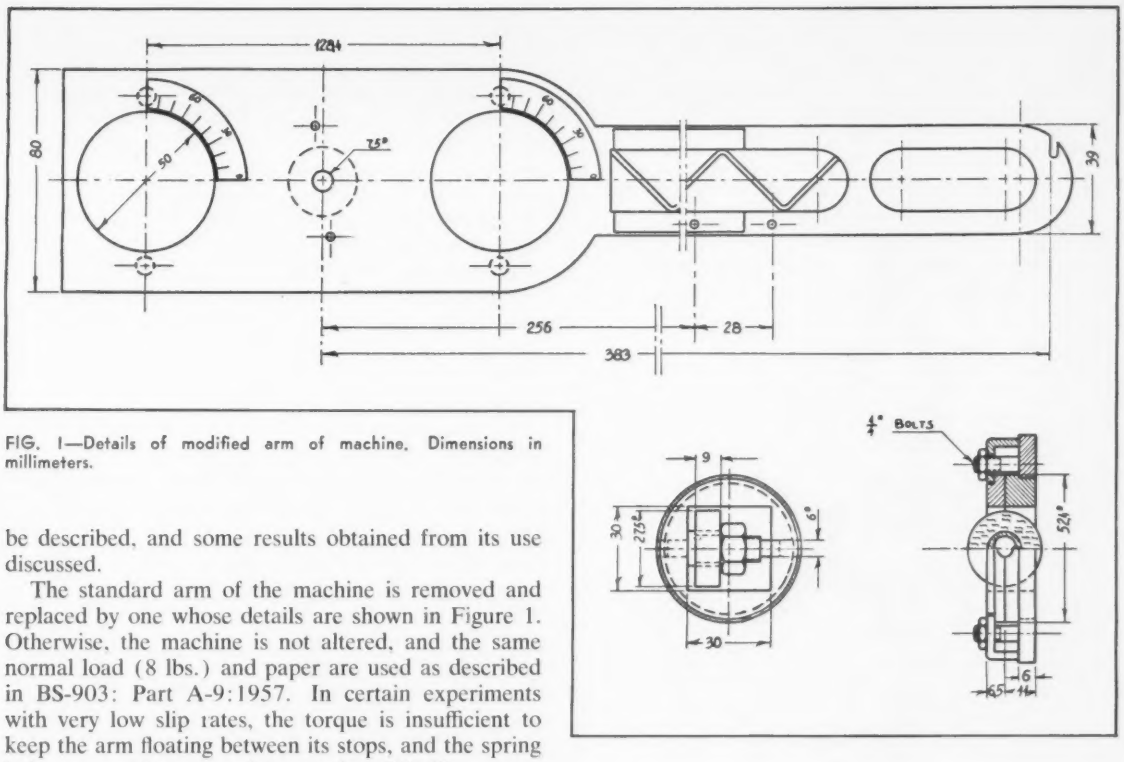


FIG. 1—Details of modified arm of machine. Dimensions in millimeters.

be described, and some results obtained from its use discussed.

The standard arm of the machine is removed and replaced by one whose details are shown in Figure 1. Otherwise, the machine is not altered, and the same normal load (8 lbs.) and paper are used as described in BS-903: Part A-9:1957. In certain experiments with very low slip rates, the torque is insufficient to keep the arm floating between its stops, and the spring balance must be reversed to supply a "lift."[3]

In order to avoid the difficulties and shortcomings due to sample deformation described by Ratner and Melinkova *(8)*, molded cylinders 28 mm. in diameter and 40 mm. long were used. These, however, caused considerable difficulties, because they were quickly worn to a curved surface at slip angles of 15° and 20°, and reading of volume loss became quite erratic. This difficulty was largely avoided by bringing the length of the cylinders to 9 mm., the diameter remaining 28 mm., and reducing the abrasion time at high rates of slip (large angle settings). The appearance of "crab walk" is very obvious, and affects the abrasion in that the disks wear conically, but uniformly so, across the width. In accordance with Shallamach's findings, this type of abrasion includes a resilience factor.

The disks are molded on to brass ferrules and seated firmly on their axles, which rotate freely in the bearings of the adjustable holders.

Operation

Several different methods of operating the machine are possible, but in order to make publication possible at the earliest moment, we have followed the simplest procedure that was likely to produce information parallel to that of Gelinas and Storey.

After molding, the samples were conditioned for at least 48 hours at room temperature, weighed, and inserted in the holders at the angle chosen. The paper had been previously used against B.S. Reference A Tread Compound in the normal manner for 10 minutes. It was found convenient, when testing a series of samples to prepare one disk of each compound under test, two disks being abraded at the same time.

After 10 minutes at 8° and 12° and 5 minutes of abrasion at 16° and 20°, the disks were removed, brushed free of dust and abraded rubber, and reweighed. A second set of disks was then placed in the holders and the operation repeated. When all disks had been once abraded, the last set was again abraded, but in reversed position, i.e., the disks which had occupied the right holder were now placed in the left one and vice-versa. The series was then abraded in the reverse order and in reversed positions, taking care that the disks were also reversed in attitude. This procedure assured (1) that any inaccuracy in setting the angles was evened out; (2) that the cutting power of the paper was also evened out. Weighing at the end of each half run also minimizes the possibility of gross weighing errors.

The number of samples in the series should be planned so that any paper is not used for longer than 90 minutes at an angle of 20°.

Should a study of the work of abrasion be required, every pair of sample disks should be of one stock, cured under identical conditions. In this case, the resisting moment will be recorded and used in the calculations, but in any procedure, the arm should be kept "floating" between its stops so that any sudden change in the character of abrasion may be observed and corrective action taken.

In order to be able to compare the results obtained, the same compounds as studied by Gelinas and Storey were used, all cured for 45 minutes at 143°C. In addition, a second series of tests was run on the reference compound (smoked sheets reinforced with

[3] See last section of this paper for final modifications.

TABLE I—FORMULATIONS OF COMPOUNDS TESTED

Compound 827	1	2	3	4	5	6
LTP (Krylene)	100	—	100	—	—	—
OEP (Krynol 651)	—	100	—	100	—	—
RSS No. 3	—	—	—	—	100	100
Zinc oxide	3	3	3	3	3	3
Stearic acid	1.5	1.5	1	1	3	3
ISAF black (Vulcan 6)	45	45	—	—	—	—
HAF black (Vulcan 3)	—	—	50	50	50	50
Naphthenic oil (Naphtenex 908)	—	—	2.5	2.5	—	—
Aromatic oil (Sundex 53)	7	2	2.5	2.5	—	—
Pine tar	—	—	—	—	5	5
Santocure	1.2	0.84	1.1	1.1	0.6	0.7
DPG	0.14	0.168	—	—	—	—
Nonox BL	0.5	0.5	—	—	—	1
Santoflex AW	0.5	0.5	—	—	—	0.5
Sulfur	1.75	1.27	2	2	3	2.5
Cure time at 143°C. (Minutes)	**45**	**45**	**45**	**45**	**45**	**30,45, 60,90**

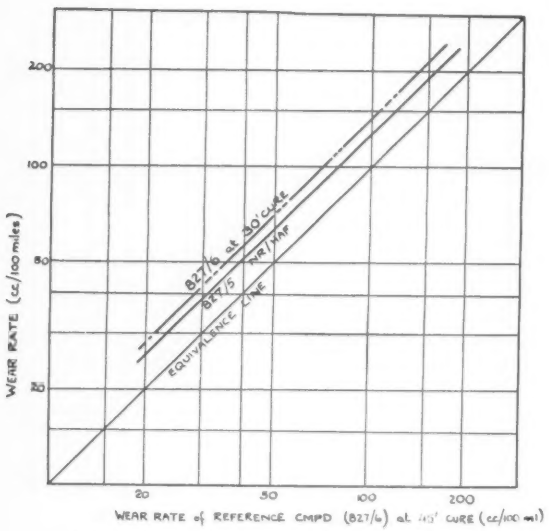


FIG. 2—Effect of cure and antioxidants on wear.

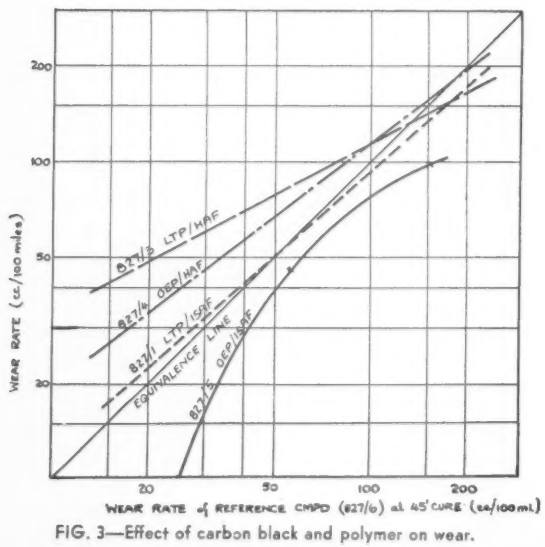


FIG. 3—Effect of carbon black and polymer on wear.

HAF black, No. 832/6) at various times of cure, in order to study the contention *(12)* that abrasion is a more critical property than tensile strength as far as cure time is concerned (Table I).

Geesink and Prat *(16)* plotted the logarithm of the wear rate of a compound against the logarithm of the wear rate of a reference compound (severity). This very convenient method of plotting information shows how a compound may change from better to worse than another at different severity of abrasion. I have followed this method and in all cases except for 827/2, the points have been found to fall on the calculated regression very closely. In the OEP/ISAF compound, it was felt that the points did not warrant the drawing of a straight line.

On studying Figure 2, it will be observed that the reference compound (827/6) at 30 minute cure shows higher loss than at 45 minute cure over the whole range studied, by a factor which varies around about 1.4. Although observations at longer cure times were attempted, uniform readings were impossible to obtain because of the appearance of "smearing," a troublesome phenomenon which sometimes occurs in abrasion testing. However, the importance of the state of cure is obvious, and it must not be assumed that the other lines drawn necessarily refer to the "best" cure, i.e. the cure showing least abrasion loss.

The importance of antioxidants and correct sulfur balance is also shown by the increased loss of Compound 827/5.

Figure 3 shows the expected advantage of ISAF over HAF black in the low temperature polymer and the oil-extended polymer, but at high severities, the loss of the ISAF loaded LTP becomes greater than the compound, loaded with HAF. This conclusion does not appear to tally with the graph in Figure 11 of Gelinas and Storey's paper, but it is difficult to appreciate from this paper what polymer was used in the HAF laboratory control, and how it was cured, so that the two cases may not be comparable.

When comparing different polymers with the same black, it appears that OEP is better than LTP (both with HAF) at lower severities, and at all severities when used with ISAF. Again, this conclusion may be influenced by the different states of cure, the accelerating system of the ISAF compounds having been adjusted for oil content, while no such adjustment was made in the case of the HAF compounds, as well as by the lubricity of the oil (Table II).

Experiments, performed on wheels with bosses varying from 26 to 16 mm. in diameter, showed virtually uniform abrasion at all angles down to 22

TABLE II—REGRESSION EQUATIONS

log. Wear Rate Compound X = a + b log. Wear Rate Compound 827/6

X	a	b
827/1	0.195	0.884
2	No regression	
3	0.989	0.553
4	0.525	0.767
5	0.141	0.973
6 (30 minute cure)	0.145	0.995

mm. (i.e. rubber thickness up to 3 mm.) but below this, the abrasion loss appears to change in different ways for different compounds. The assumption is that this is due to the inter-relation between modulus, friability and abrasion already mentioned, and therefore reflects the mechanism of abrasion of a tire. Ultimately, to obtain maximum correlation with roadwear, the dimensions of the boss may have to be adjusted so that the compound bending and torsional resistance of the disk (measured under the conditions of "crab walk") is similar to that of a tire when account is taken of its size.

Conclusions

The above descriptions show that while much work still remains to be done on the subject, especially in connection with correlations with fleet-testing of tires, a simple and practical laboratory method of studying abrasion of tread and similar compounds, and of studying the relation between compounding and processing on the one hand and abrasion resistance on the other has been proposed which is within the reach of the most modest laboratory.

In proposing the wider use of this modification, I wish to make it quite clear that I do not consider that a laboratory test of any complexity will take the place of fleet testing. However, the use of such a device is likely to be able to provide information on particular aspects of abrasion which, because of the complex picture offered by fleet testing, would not be capable of identification or study.

Communications received relating to the work in the above stage pointed out that the abrasion losses recorded were up to 40 times as large as would be obtained in road fleet-testing, and that it might not be permissible to extrapolate the graphs by more than one cycle. It was suggested that abrasion against wire gauze might reduce the losses to more reasonable rates. Following the work reported above, we have used 40 mesh steel wire gauze and obtained the result plotted in Figure 4. Under these conditions, one hour abrasion at each angle setting is required for reliable readings to be obtained.

It was also found advisable to standardize on a reference compound which would not be as sensitive to variations of mixing techniques as are natural rubber/carbon black dry mixed compounds. Accordingly, we have standardized on Compound 838/1 detailed in Table III and Figure 4.

TABLE III—FORMULATIONS OF TWO TEST COMPOUNDS

	838/1	867/1
Smoked sheets	—	100
SBR 4650	165	—
Stearic acid	1.5	2
Zinc oxide	5	4
BLE	1	—
Bayer 4010	1	—
PBN	—	1
Flectol H	—	1
HAF	—	45
Vulcatard A	—	0.5
Santocure	1.25	0.5
Sulfur	1.75	2.5
Cure Temperature (°C.)	**145**	**138**
Cure Time (minutes)	**40**	**30**

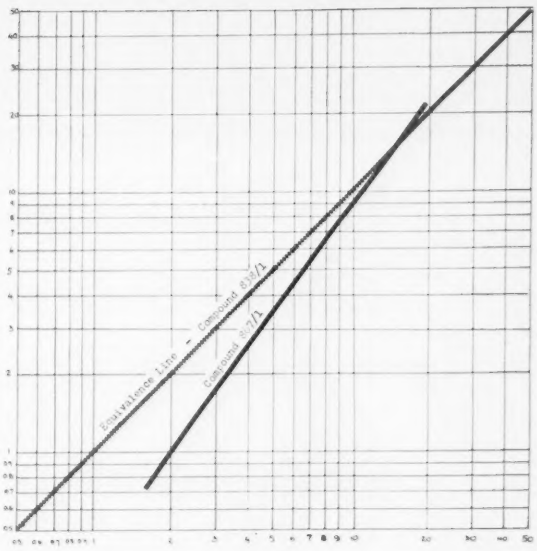


FIG. 4—Abrasion losses against 40 mesh steel wire gauze. Compound 838/1 has been adopted as standard in subsequent work.

ACKNOWLEDGMENTS

The work on which this note is based forms part of a larger study, made possible by a grant from the Ministry of Commerce and Industry, and the U.S.-Israel Joint Fund, on the properties and applications of reclaimed rubber.

The assistance of Mr. Stephan Fass in carrying out much of the technical work involved is gratefully acknowledged.

LITERATURE REFERENCES

(1) British Standard 903: Part A-9; Method A, Sec. 3.2, 1957. This paper has also been adopted by ISO for Standard R-33.

(2) British Standard 903: Part A-9; Method C, 1957.

(3) Geesink, H.A.O.W., and Prat, C.I.P., *Rev. Gen. Caout.*, Vol. 33, p. 973 (1956).

(4) Gelinas, L. P., and Storey, E. B., "Proc., International Rubber Conference, Washington, 1959," American Chemical Society, Washington, D.C., 1959.

(5) Lambourn, L. J., "Trans. Inst. Rubber Ind.," Vol. 4, p. 210 (1928).

(6) Juve, A. E., Fielding, J. H., and Graves, F. L., ASTM Bulletin No. 146, p. 77 (1947).

(7) See for instance Reinsmith, G., Stiehler, R. D., and Gregg, A. P., abstract in *Rubber Age*, Vol. 72, p. 784 (1953).

(8) A new edition of the Russian Standard GOST 426 appears to be in preparation, in which the height of the abrasion sample will be reduced to 3.5 mm. See Ratner, S. B., and Melinkova, N. V., *Kauchuk and Rezina*, Vol. 17, No. 8, p. 14 (1958). (Trans., *Rubber Chem. Tech.*, Vol. 32, No. 4, p. 1199 (1959)).

(9) Shallamach, A., *Wear*, Vol. 1, p. 386 (1957, 1958).

(10) Shallamach, A., *Rev. Gen. Caout.*, Vol. 36, p. 1479 (1959).

(11) Tabor, D., *Rev. Gen. Caout.*, Vol. 36, p. 1401 (1959).

(12) Upham, F. N., *Trans. Inst. Rubber Ind.*, Vol. 20, p. 101 (1944). See also Table 918 of Dawson, T. R., and Porritt, R. D., "Rubber; Physical and Chemical Properties," Croydon, 1935.

(13) Vogt, W. V., *Ind. Eng. Chem.*, Vol. 20, p. 302 (1928).

The Elastomeric Properties of Certain Unsaturated Copolymers Containing Ethylene and Propylene

As previously reported *(1)*, linear, high molecular weight amorphous ethylene-propylene random copolymers with very interesting elastomeric properties were prepared by us several years ago.

The vulcanization of these copolymers can be carried out by using several different methods *(2)*, which though yielding good results are based on compounds and techniques that are not normally employed in the rubber industry. Therefore our research work in the field of amorphous ethylene-α-olefins copolymers was accompanied from the very beginning by systematic investigations with the express purpose of obtaining copolymers containing unsaturations in the macromolecules.

These unsaturations should be present in limited number in order not to reduce to any great extent the very desirable properties of resistance to aging and to oxidation which are characteristic of rubbers based on ethylene-propylene copolymers. On the other hand, in order to obtain vulcanized products having good mechanical properties by vulcanization with the aid of compounds normally used for synthetic rubbers of low unsaturation, it is necessary that unsaturations be present in all the macromolecules. Furthermore, they must be distributed in a suitable way in each macromolecule.

Using particular catalytic systems and particular types of monomers, we succeeded in preparing unsaturated, sulfur-vulcanizable copolymers of

TABLE I—FORMULATIONS OF THE DIFFERENT COMPOUNDS USED

	Gum Type Compound Recipe A	Tread Type Compound Recipe B	Tread Type Compound Recipe C
Copolymer	100	100	100
Zinc Oxide	5	5	5
Stearic Acid	2	2	2
Antioxidant (FβNA)	1	1	1
Sulfur	2	2.5	2.5
TMTD	1	1.25	1.25
MBT	0.5	0.75	0.75
HAF Black	—	50	50
Necton 60 (oil)	—	—	10

TABLE II—PROPERTIES OF THE COPOLYMERS VULCANIZED IN THE ABSENCE OF REINFORCING FILLERS, USING RECIPE A—VULCANIZATION 150°C. x 30 MINUTES

	Properties of Raw Polymers			Properties of Vulcanizates						
Sample No.	Double bonds, Content, %	Intrinsic Viscosity, dl./g.	Mooney Viscosity, ML 1 – 4	Tensile strength, kg/cm²	Elongation at break, %	Modulus at 300%, kg/cm²	Hardness, Shore A	Resilience at 20°C., %	Resilience at 90°C., %	Q_m
1	0.65	2.06	70	60	750	10.5	65	76	76	3.68
2	1.15	1.92	—	27	620	9.8	58	75	70	3.55
3	1.25	1.96	66	21	550	10.0	62	75	74	3.46
4	1.45	1.63	—	24	510	11.8	56	66	72	3.43
5	1.8	1.74	51	33	465	14.5	64	76	78	3.01
6	2.2	1.55	22	22	460	12.0	58	69	71	3.57
7	2.2	1.62	35	34	460	15.2	65	80	82	3.00
8	2.8	1.80	54	25	325	21.5	68	80	86	2.78

By GIULIO NATTA

Director, Institute of Industrial Chemistry
Polytechnic of Milan, Italy

and

GIOVANNI CRESPI, GIORGIO MAZZANTI, ALBERTO VALVASSORI, GUIDO SARTORI, PAOLO SCAGLIONE

Montecatini Societa Generale
Milan, Italy

homogeneous composition which were free of gel products.

More precisely, the copolymerization products prepared are made up of macromolecules essentially consisting of ethylene and propylene monomeric units and containing small amounts of double bonds. These double bonds are distributed in such a homogenous way as to render the crude copolymers easily vulcanizable when using the ingredients and conditions normally employed in the rubber industry.

In this paper we wish to discuss in a preliminary way the behavior of these new copolymers with respect to vulcanization, and to report some properties of the vulcanized products thus obtained.

Characteristics of the Copolymers

The copolymers described in this paper are completely amorphous upon X-ray examination and contain almost equal molar proportions of ethylene and propylene. In addition they contain various amounts of double bonds, up to a maximum of 3 double bonds per 100 total monomeric units. The composition of these ethylene-propylene copolymers has been evaluated by infrared and radiochemical analyses.

Adopting particular polymerization conditions, we have prepared by direct synthesis crude copolymers having a controlled molecular weight (intrinsic viscosity in toluene at 30°C. is between 1.5 and 2.1), which possess very good processability.

We can produce copolymers with a desired molecular weight and Mooney viscosity within a wide range. The copolymers reported in this paper, as shown in the Tables below, possess Mooney viscosity values ranging between 20 and 70 (determined at 100°C., ML 1–4).

Compounding and Vulcanization

In order to compare the vulcanization behavior of copolymers having a different degree of unsaturation, we have used rather simple mixes based on sulphur and accelerating agents. We have operated either in the absence of reinforcing fillers or in the presence of carbon black. The compositions of the different

TABLE III—PROPERTIES OF THE COPOLYMERS VULCANIZED IN THE ABSENCE OF REINFORCING FILLERS, USING RECIPE A—VULCANIZATION 150°C. x 60 MINUTES

	Properties of Raw Polymers			Properties of Vulcanizates						
								Resilience		
Sample No.	Double bonds, Content, %	Intrinsic Viscosity, dl./g.	Mooney Viscosity, ML 1 – 4	Tensile strength, kg/cm²	Elongation at break, %	Modulus at 300%, kg/cm²	Hardness, Shore A	at 20°C., %	at 90°C., %	Q_m
1	0.65	2.06	70	58	700	11.4	65	77	78	3.45
2	1.15	1.92	—	15	350	11.7	62	75	76	3.27
3	1.25	1.96	66	31	510	13.4	65	75	76	3.22
4	1.45	1.63	—	22	400	14.4	60	70	75	3.20
5	1.8	1.74	51	26	365	17.8	66	79	83	2.87
6	2.2	1.55	22	20	360	15.7	63	71	78	3.27
7	2.2	1.62	35	28	370	19.0	66	81	84	2.77
8	2.8	1.80	54	24	285	—	71	80	85	2.69

TABLE IV—PROPERTIES OF THE COPOLYMERS VULCANIZED IN THE PRESENCE OF REINFORCING FILLERS, USING RECIPE B—VULCANIZATION 150°C. x 30 MINUTES

	Properties of Raw Polymers			Properties of Vulcanizates					
								Resilience	
Sample No.	Double bonds, Content, %	Intrinsic Viscosity, dl./g.	Mooney Viscosity, ML 1 – 4	Tensile strength kg/cm²	Elongation at break, %	Modulus at 300%, kg/cm²	Hardness, Shore A	at 20°C., %	at 90°C., %
1	0.65	2.06	70	175	590	47	82	55	56
3	1.25	1.96	66	240	620	71	86	53	56
4	1.45	1.63	—	224	530	89	80	45	54
5	1.8	1.74	51	230	430	120	85	54	60
6	2.2	1.55	22	196	440	121	85	43	53
7	2.2	1.62	35	227	400	154	84	54	60
8	2.8	1.80	54	191	280	—	90	54	64

mixes are reported in Table I. Of course, for a certain degree of unsaturation in the copolymer, the use of more active recipes leads to more vulcanized products.

Mixing with the vulcanization ingredients and fillers is easy, because of the very good processability of the materials on the mill-mixer.

Vulcanization was carried out at 150°C. for different periods of time. Mechanical properties have been evaluated on specimens according to ASTM D-412 (specimens of C and D type) at a rate of separation of the grips of 500 mm./min. Resilience was determined with the aid of a Microrebound Pirelli apparatus *(3)*. The volume swelling ratio at equilibrium (Q_m) was measured in benzene at 30°C.

Properties of the Vulcanizates

(1) Vulcanizates in the absence of reinforcing fillers. In Tables II and III, the most important properties of certain copolymers with different unsaturations after vulcanization at 150°C. (for 30 and 60 minutes respectively, using Compound A) are reported. From these tables one can see that:

(a) All other conditions being equal, the modulus at 300 percent and the degree of crosslinking increase with an increase in double bond content. At the same time, the elongation at break decreases. Some apparent discrepancies (Samples No. 2, 3 and 6) depend on differences in molecular weight and Mooney viscosity.

(b) When protracting the time of vulcanization from 30 to 60 minutes, the degree of crosslinking increases, as is demonstrated by the increase of the modulus at 300 per cent and lowering of the swelling ratios. Reversion reactions were not detectable even when using vulcanization times up to 240 minutes.

(c) The degree of crosslinking is fairly high even in the case of copolymers having a Mooney viscosity as low as 22.

(d) The resilience of these copolymers is fairly high and is practically the same as the one of ethylene-propylene copolymers. The variation of resilience with temperature (between –50°C. and +150°C.), is illustrated in Figure 1. The temperature corresponding to a minimum of rebound is rather low (near to –35°C.). Resilience at room temperature is very high and remains between 85 and 90 per cent between 20° and 140°C.

(2) Vulcanizates in the presence of reinforcing fillers. The properties of the copolymers vulcanized in the presence of reinforcing fillers (Recipe B) at

TABLE V—PROPERTIES OF THE COPOLYMERS, VULCANIZED IN THE PRESENCE OF REINFORCING FILLERS, USING RECIPE B—VULCANIZATION 150°C. x 60 MINUTES

	Properties of Raw Polymers			Properties of Vulcanizates					
								Resilience	
Sample No.	Double bonds, Content, %	Intrinsic Viscosity, dl./g.	Mooney Viscosity, ML 1 – 4	Tensile strength kg/cm²	Elongation at break, %	Modulus at 300%, kg/cm²	Hardness, Shore A	at 20°C., %	at 90°C., %
1	0.65	2.06	70	266	680	56	85	55	56
3	1.25	1.96	66	246	495	102	85	55	59
5	1.8	1.74	51	225	360	170	85	55	61
6	2.2	1.55	22	206	320	192	87	45	57
7	2.2	1.62	35	209	290	—	87	54	56
8	2.8	1.80	54	210	240	—	87	55	66

TABLE VI—PROPERTIES OF THE COPOLYMERS, VULCANIZED IN THE PRESENCE OF REINFORCING FILLERS, USING RECIPE C—VULCANIZATION 150°C. x 15 MINUTES

	Properties of Raw Polymers			Properties of Vulcanizates					
								Resilience	
Sample No.	Double bonds, Content, %	Intrinsic Viscosity, dl./g.	Mooney Viscosity, ML 1 – 4	Tensile strength kg/cm²	Elongation at break, %	Modulus at 300%, kg/cm²	Hardness, Shore A	at 20°C., %	at 90°C., %
1	0.65	2.06	70	265	780	36	80	55	57
3	1.25	1.96	66	255	640	64	79	55	58
4	1.45	1.63	—	210	520	86	79	48	57
5	1.8	1.74	51	228	450	104	82	55	62
6	2.2	1.55	22	196	430	121	80	44	55
7	2.2	1.62	35	207	390	135	85	53	55
8	2.8	1.80	54	218	330	185	84	56	67

150°C. are reported in Table IV (vulcanization time, 30 minutes) and in Table V (vulcanization time, 60 minutes).

The properties of the products vulcanized at 150°C. for 45 minutes using Recipe C are indicated in Table VI.

When examining these last tables, in addition to the considerations already stated for Tables II and III, one can observe that the carbon black-reinforced products generally possess good properties which are equal to or better than those of the most common synthetic rubbers.

Furthermore we have observed that different mechanical properties within a wide range can be obtained by varying the content in ethylene, or the molecular weight of the copolymer (similar to what was already observed for previously described ethylene-propylene copolymers), or the degree of unsaturation.

The copolymers also possess good resistance to aging due to the low content in double bonds. Aging tests, carried out on the copolymers vulcanized as indicated in Table V, showed that no practical alteration of the properties occurred after the samples were maintained for eight days in an air-circulating oven at 100°C.

Conclusions

The random copolymers described in this paper essentially consist of ethylene and propylene and contain small amounts of double bonds. They are easily vulcanizable by the usual methods and represent a new type of general purpose rubber.

With respect to the previously known general purpose rubbers (e.g., SBR), these new rubbers possess similar mechanical properties, together with a much higher resistance to aging.

With respect to other low unsaturated rubbers (e.g., butyl rubber) the new copolymers possess remarkably better dynamic and mechanical properties.

The high content in ethylene and propylene indicates that the production of these copolymers will be fairly economical, making possible their use on a large scale commercial basis.

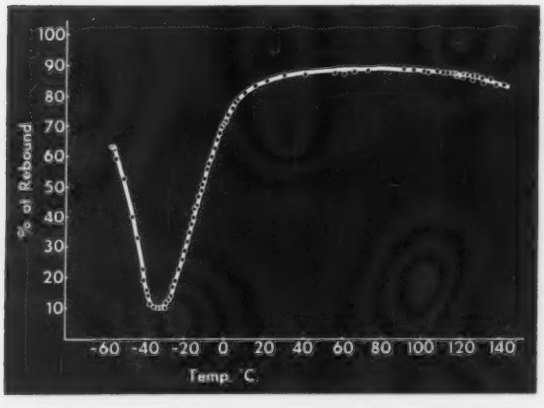


FIG. 1—Typical rebound curve vs. temperature of a vulcanized ethylene-propylene copolymer (Recipe A). Degree of unsaturation in starting copolymer: two double bonds per 100 monomeric units.

LITERATURE REFERENCES

(1) Natta, G., *Rubber and Plastics Age*, Vol. 38, p. 493 (1957); Natta, G., Mazzanti, G., Valvassori, A., and Pajaro, G., *Chimica e Industria*, Vol. 39, p. 733 (1957); Mazzanti, G., Valvassori, A., and Pajaro, G., *Chimica e Industria*, Vol. 39, p. 825 (1957); Natta, G., and Crespi, G., *Chimica e Industria*, Vol. 41, p. 123 (1959); Natta, G., Mazzanti, G., Valvassori, A., Sartori, G., and Morero, D., *Chimica e Industria*, Vol. 42, p. 125 (1960); Natta, G., and Crespi, G., *Rubber Age*, Vol. 87, p. 459 (1960).

(2) Natta, G., Crespi, G., and Bruzzone, M., *Kautschuk und Gummi*, Vol. 14, p. 5460 (1961); Di Giulio, E., Ballini, G., (paper presented at D.K.G. Congress, Berlin, October 4-8, 1960); *Kautschuk und Gummi*, in press; Natta, G., Crespi, G., Di Giulio, E., Ballini, G., and Bruzzone, M., *Rubber and Plastics Age*, Vol. 42, p. 53 (1961).

(3) Oberto, S., International Rubber Conference, Washington, November 9-13, 1959.

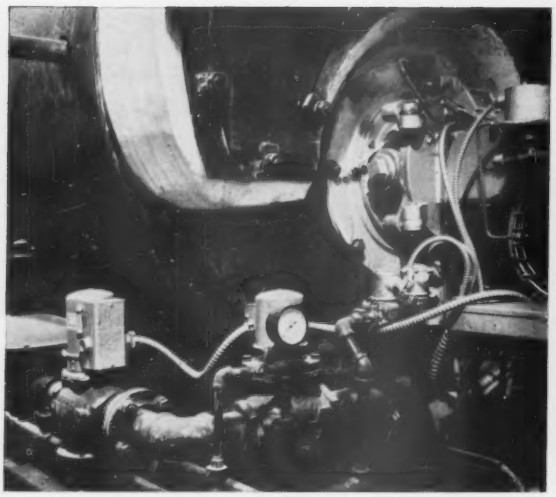


FIG. 1—Double safety valves eliminate need for an attendant.

FIG. 2—Humidity control along ceiling is well out of the way.

Laboratory Service Boiler Room

Centralized facilities for efficient performance

LABORATORIES, according to some architects, represent one of the most difficult of all design problems. The reason, of course, is the unusually large number of service facilities which must be provided. United Carbon Company's Service Laboratory in Akron, Ohio, is no different. Faced with the problem of supplying adequate service facilities there, laboratory manager Frank O. Holmes conceived of a centralized service and boiler room through which all of these would be channeled.

The compact boiler-service room which eventually resulted is 25 feet wide, 18 feet deep, and 10 feet high. Packed into it (see numbered layout below) is a 200 psi boiler (1) for supply of steam and heat, plus equipment for air conditioning (2), ventilation, water supply (3 through 10), power, and telephone lines.

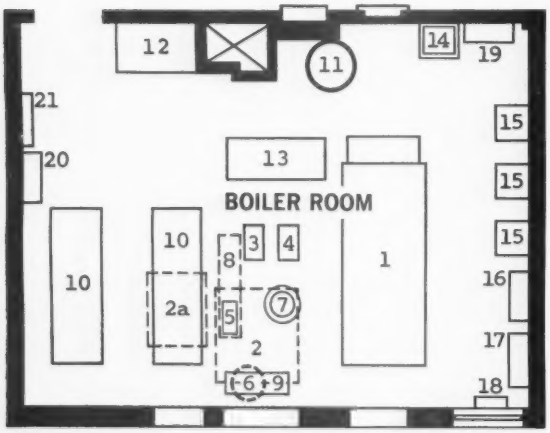


FIG. 3—Layout of boiler-service room. Numbers are keyed in text.

The gas-fired boiler, in addition to producing 200 psi steam for the vulcanizing presses, supplies 100 pound steam to all process equipment, and 15 pound steam to heating equipment and chillers. The double sets of safety valves shown in Figure 1 eliminate the need for an attendant engineer.

Two air handling units near the ceiling, shown in Figure 2, keep offices and the smaller laboratory rooms supplied with fresh air. They are also used to maintain constant temperature and humidity in the Tensile Testing area.

A domestic hot water heater (11), two air compressors (13) and (20), an incinerator (12), and a sink (14), are contained in the same room. The main electrical circuits enter the boiler room, which also houses three 25 KVA transformers (15), the circuit terminal panel and meter (17), the main circuit breaker (18), and the power (21), and distribution panel (16), for the 220 volt circuits. Four telephone trunk lines terminate and are redistributed on terminal panel (19).

Since its construction, the boiler room has been described as one of the most complete, efficient such systems in existence today. The architect who designed it was Harold S. Cassidy of Akron. Engineering was handled by Lind and Associates of Cuyahoga Falls.

EDITORIAL

Visitors—Visitors—Visitors

► Gentleman came in to see us the other day. Was charged with the responsibility of constructing a fairly good-sized mechanical goods plant in South America. Wanted some advice about equipment. Had spoken with domestic producers. Had spoken with German producers. Had spoken with Japanese producers. Quality of equipment? About equal, says he. Availability of replacement parts? About equal, says he. Price? Japanese lowest; U.S. highest; German in-between. Technical service? Available from U.S. Available from Germany. Provided by Japanese. "What do you think," he asks, "will I do wrong in buying the Japanese equipment?"

Gentleman came in to see us the other day. Wanted some information about molds. Complains. Domestic prices very high. Friend had some made in Hong Kong. Inexpensive. Good quality. Holding up. What to do?

Gentleman came in to see us the other day. Scandinavian. Has chemicals for sale. Just like U.S. products. Can ship large quantities. Expects ready market. Low price. How to handle? Sell direct to consumers? Work with agent? Emphasizes low price. Emphasizes good quality.

Gentleman came in to see us the other day. Needs tank balls for flush toilets. Tank balls have odd shape. Been looking around domestic market. Not much luck. Good bid from Italian company. Reasonable price. Fast delivery.

Gentleman came in to see us the other day. Made earring cushions. Vinyl foam. Small pieces. Can't find domestic fabricator. Item sells in variety stores. Large volume. Low cost. Last batch made abroad. Would like to deal domestically. Domestic manufacturers' costs too high.

Gentleman came in to see us the other day. Medical problem. Continence pants. Domestic price problem. Had been dealing with French plant. Good price. Slow delivery. Problem: Price or delivery?

Gentleman came in to see us the other day. Market analyst. Major U.S. company. Wanted to know about consumption trends all rubber 1965-70. U.S. World.

Gentleman came in to see us the other day . . . .

Temporary help can pay off in savings

By JOHN H. FRANK
Executive Vice President
Manpower, Inc.
Milwaukee 3, Wis.

How to Use a Leased Staff

► As costs of production continue to inch their way upward, it has become increasingly difficult, yet increasingly important, for manufacturers to pinpoint expenses which can be reduced easily. Of these, payroll costs often occupy the highest percentage position, yet contain certain elements of flexibility that are not fully appreciated.

The flexibility of payroll expenses lies not in the flat hourly rate which employees receive. This will always be a "hard-core" cost. Rather, it lies in less obvious, "hidden" expenses. These costs stem mainly from the work load and work force fluctuations that are characteristic of all industries: the constant shifting of a firm's work load—and thus its work force—from light to heavy with every emergency, seasonal peak, special project, and large order that comes along.

Either permanent employees are hired for short term jobs and must be dismissed after the project is completed, or else there are permanent employees on the payroll for the purpose of handling peak periods and with little or nothing to do in normal times.

A second part of the hidden payroll cost lies in the tremendous expenditure of money in advertising for, screening and training an employee who will not repay the investment made in him. He is needed only for a short time and must be released at the termination of the emergency for which he was hired. A third part of the hidden cost is the high expense of fringe benefits which every firm undertakes.

These three points make up the hidden costs of labor. The key to their reduction lies in a not-so-recent innovation—the matching of work force to work load by using the services provided by temporary help firms.

This concept is already being utilized to an increasing extent by rubber firms and is in wide use by other kinds of industry. It works this way. A firm contracts for whatever services are needed above the normal or minimum force, thus matching his work force exactly with his daily work load. Every day, if need be, the number of employee-hours can be changed. When short-term jobs come up, more services are used until the job is completed. Only enough permanent employees need be retained for the normal amount of work. There are no time or money expenditures in acquiring or training these workers. Fringe benefits are paid by the temporary help service firm.

The single concept on which temporary help service is based, the leased staff, is one of its biggest assets. By leasing services to meet peak loads, a minimum of permanent help can be retained. In Newark, for example, a manufacturer of extruded louvers for ventilating equipment, was able to meet the normal flow of work with members of the production crew handling all packing and shipping. Yet every so often an exceptionally large contract had to be filled. At those times the firm was unable to spare men from production to handle shipping and packing, yet the average volume of business was below that which would warrant a full-time shipper. With the use of a temporary help service for the occasional large order, this problem has been solved.

Tire Manufacturer

An automobile tire manufacturer in Michigan had to map out a parts schedule for his plant once a month. Before he discovered Manpower, Inc., he used 50 full time workers for more than two weeks a month to do the job; many of these employees had little else to do during the other two weeks. Now, employing only enough men as are needed for production and using the services of 150 girls one weekend a month, the manufacturer saves an estimated $75,000 a year. And normal production is not slowed because the job is done on weekends.

There is one interesting point which might serve to show the employer just why inefficiencies of this type are so difficult to detect. Most people have heard of Parkinson's First Law, which although originally taken to be facetious has been found to have a strong element of truth: "Work expands in proportion to the time available to do it." It is the age-old trend toward bureaucracy—not only in government but also in industry—that operates all around the manufacturer. It is a trend that boosts the rate of work force vs. work load inefficiencies. In each of the above cases workers *could* have expanded their work to the time allotted; and they usually do, whether they are conscious of it or not. The job of the employer is to judge the extent to which Parkinson's Law is his firm's law.

While it might seem strange that there are many people who will just take short term assignments on short notice at any time and then drop the job when completed, temporary help organizations have little trouble finding people to fill every skill. Many people—housewives, retired professionals or people between jobs—are eager to earn a few extra dollars here and there. These people go to a temporary help organization and, if they pass its rigid standards, are listed for future reference. They are actually hired by the organization, the organization assuming the bookkeeping, fringe benefit costs, hiring costs, etc., and are contacted whenever a client of the organization needs the services of extra help. There is no problem with working sporadically or for long hours at a time; this is what the worker wants.

When thousands of skilled people come to an organization for work and are screened for employment, the second major advantage of the temporary help business service comes to the fore: the temporary help organization makes a business out of advertising, testing, screening and training, doing all on a concentrated, efficient basis with costs at a bare minimum.

While a firm hiring for itself would have to wait for advertisements to be placed, responses to come, interviews to be held and training periods to be carried out, the temporary help organization has only to telephone the best-suited people on its list and assign them to the job. Studies by one company show that it takes an average of 11 days for the filling of even a general labor job: it is possible to call a temporary help bureau at 4:00 one afternoon and have help the next morning.

But the most prominent aspect of this question is the money saved by letting someone else—who can do it cheaper and easier—fill the work force demands which so often arise. Businesses lose perhaps millions a year because of antiquated "horse and

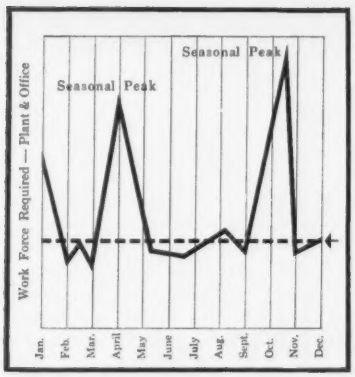


FIG. 1—By the use of temporary help it is possible to hold the permanent work force at the level indicated by dotted line.

buggy" hiring philosophies. Too many firms hire blindly to fill an immediate need without thinking that when the work slacks off the money invested in the short-term employees will not have been repaid in services. The same study cited above showed that over $5,000 is invested in a new employee during his first year. An average of $218 is spent to recruit the worker, $141 for screening, $34 for psychological testing, $1,019 for training, $1,521 in actually unearned pay and $2,496 because of errors and failures. The total is $5,429.

For firms with a real need for more permanent help this investment must be expected. But in view of the money spent and the time lost (approximately 50 hours of non-productive training time for the employee, 10 hours for his supervisor), it is unhealthy for hiring to be initiated simply because an overload is expected.

When a large rubber firm recently decided to change the basis of its filing system, it realized that the job would be too much for regular employees. File folders had to be typed and the folder's contents culled and rearranged before the folders could be filed according to the desired system. Without having to overwork his regular employees or go to the time and expense of hiring help that would be with him for only a few months, the manager of the firm was able to complete the rearrangement in 10 months—with the services supplied by Manpower.

Cheaper Firing

Nor is firing an employee a costless action any more. Coupled with his hiring, the dismissal of an employee costs one Chicago firm $411, an insurance company $700 and an aircraft manufacturer $1,000. Thus, to hire and fire his own temporary help is presently just too costly a venture for the employer; when the job is of a short-term nature it is hard for the private firm to match the speed and efficiency of a temporary help service in supplying the needed assistance.

The third part of the hidden payroll costs mentioned in the beginning of the article is that which is expended for fringe benefits; currently, this figure is $.58 per hour per employee. Fringe benefits include such legally-required costs as OASI, federal and state unemployment compensation and workmen's compensation. Payments agreed upon by both management and employees are pensions, health and welfare plans, employee discounts, paid rest periods and lunch hours, paid holidays, sick leaves, jury duty or bereavement pay, Christmas bonuses and service awards.

A survey this year by the Milwaukee Association of Commerce has estimated that an average of 21.2 per cent of the gross payroll—$.58 an hour—is spent in fringe benefits. In 1955 these figures were 20 per cent or $.392 an hour. In 1957 they were up to 21.8 per cent or $.474. No doubt they will continue to climb.

But the temporary worker, employed by the service bureau, many times does not work for a long enough period of time at any one time to qualify for benefits such as unemployment compensation. Also, because he works only once in a while, is not totally dependent on this work for support, and doesn't expect payment for hours not actually worked, the temporary worker does not require extensive benefits under the other categories.

Perhaps a closer look at one aspect of fringe benefits, payments for time not actually worked, would show the advantage of a temporary help service even more clearly. Consider the typist who works 40 hours a week, being paid for 2080 hours a year. Of these 2080 hours, 40 may actually be counted as a paid vacation of 2 weeks. Six paid holidays a year constitute another 48 hours. At the rate of ½ day a month, 48 hours are spent in illness or absenteeism for some other purpose. At ½ hour a day for rest periods, 118 more hours are spent unproductively. And with 12 hours of honor time the total number of unproductive hours averages 306 a year. Only 1774 of the 2080 hours are spent in actual work, yet the other 306 hours are still paid for. With the services of a temporary help organization hours are recorded time-clock style; the client pays only for those hours which are spent productively, where at $1.50 an hour he would otherwise have to pay $460 in unearned wages.

Another factor, related both to fringe benefits and a firm's rate of turnover, is unemployment compensation. The more people that must be laid off or fired because of the termination of an overload, the more people make unemployment claims against a firm, and the higher is its rate of payment to each. Yet, if the work force can be kept at a normal minimum and services contracted from a temporary help organization for emergencies, the firm can reduce its turnover and its merit rating. One Chicago firm with an annual payroll of $3 million improved its rating from 2.7 per cent to .5 per cent of its payroll over two years of using temporary help. The saving amounted to $66,000.

And no worries or expenses need be harbored concerning insurance. Employees of Manpower, for example, are insured for from $100,000 general liability against property damage to $500,000 general and products liability against bodily injury.

There is no business, no matter what activity it is engaged in, which is not suited to the use of temporary services. The one qualification which does exist—that the firm have a work load problem—is easily met by all businesses due simply to the nature of the economic world.

Temporary Help Organizations

In the past, and at present, Manpower has performed countless tasks for rubber firms. A national tire and rubber company has used stenographic, dictaphone, typing, filing, IBM key punching, truck unloading, tire washing, hand bill distribution, reception, tire sorting and accounting services. Another company makes frequent use of material handling, inventory and vacation fill-in services. A midwestern headquartered firm called on Manpower to test drive cars equipped with the company's tires. A manufacturer of children's balloons has used Manpower to stage balloon demonstrations in variety stores all over the nation.

Though in using temporary help services it may seem that a company is simply consolidating bills and adding a small extra amount—for the reasons cited above, the services of temporary help have definitely proven more economical in the long run when fluctuating work loads are the problem to be solved.

SPECIAL INDUSTRY REPORT

IRSG Sees World New Rubber Use of 3.9 Million Long Tons in 1961

► The Management Committee of the International Rubber Study Group, London, England, has estimated that in 1961 the world consumption of both natural and synthetic rubber will reach 3,902,000 long tons. The Committee estimates that the natural rubber consumption figure will be 2,037,000 long tons, and synthetic rubber consumption will be 1,865,000 long tons, apart from synthetic rubber produced in non-member countries.

It was estimated that world production of natural rubber would be 2,035,000 long tons and synthetic rubber production in member countries would be 1,897,000 long tons, while the annual production capacity of synthetic rubber in member countries is estimated at 2.6 million long tons. In addition, the Committee estimates that some 30,000 long tons of natural rubber would be delivered from government stockpiles.

According to the Committee's estimates, the United States' natural and synthetic rubber requirements in 1961 will be 1,480,000 long tons, 37.9 per cent of the world consumption figure. In synthetic rubber production, the United States is expected to produce 1,280,000 long tons, 67.4 per cent of the member countries' figure.

Table I—Estimated Natural and Synthetic Rubber Consumption in 1961

(in 1,000 long tons)

Territory	*Natural*	*Synthetic*	*Total*
United States of America	420	1,060	1,480
United Kingdom	165	123	288
Federal Republic of Germany	141	120	261
Japan	169	80	249
France	128	98	226
Italy	77	58	135
Canada	33	59	92
Czechoslovakia	47	2*	49
Australia	34	26	60
Netherlands	21	13	34
Belgium +	15	12	27
Austria	11	11	22
Indonesia	18	—	18
Denmark	6	3	9
Hungary	8	1*	9
Federation of Malaya and Singapore	7	—	7
Other Member Countries **	7	—	7
Other Countries	730	199	929
Total	2,037	1,865	3,902

* Consumption data for synthetic rubber exclude synthetic rubber produced in non-member countries. ** Comprising Burma, Cambodia, Ceylon, Liberia, Nigeria, Thailand, and Viet-Nam. + Including an allowance made by the Management Committee for Luxembourg. Note: The oil-content of oil-extended rubber is included in the figures.

Table II — Estimated Natural Rubber Production in 1961

(in 1,000 long tons)

Territory	Production
Federation of Malaya and Singapore	730
Indonesia	650
Thailand	165
Ceylon	98
Viet-Nam	77
Nigeria	60
Sarawak	45
Liberia	43
Cambodia	38
Other British Borneo	25
Burma	11
Territory of Papua and New Guinea	5
Other Countries	88
	2,035
Deliveries from Strategic Stockpiles	
Estimated Total Deliveries	30
Total New Supply	2,065

Table III—Estimated Synthetic Rubber Production in Member Countries in 1961

(in 1,000 long tons)

U. S. A.	1,280
Canada	160
Federal Republic of Germany	120
United Kingdom	110
Italy	75
Other Member Countries	152
Total	1,897

Goodrich Expanding Akron Tire Facility

► B. F. Goodrich Co., Akron, Ohio, is investing an additional $2 million on the expansion and modernization of its Akron tire production facilities. Work on the expansion is underway, with completion scheduled before the end of 1961. According to J. W. Keener, president and chief executive officer of Goodrich, the expansion is designed to improve and enlarge facilities for the production of airplane and off-the-highway tires.

Mr. Keener states that this investment is part of a $10 million modernization and expansion program that was started in 1960 and will continue through 1961. Included in the program, in addition to the tire project, is the installation of a new boiler, and modernization of several major departments in the Tire, Industrial Products, and Aviation Products Divisions.

More than half of the funds required for this program have already been appropriated and work on some of the projects is well under way, Mr. Keener says. Approximately 60 per cent of the total program will be for tires, and the remainder for other product divisions and plant-wide service facilities. The Goodrich president added that from 1950 through 1961, the company will have invested in Akron more than $50 million in capital expenditures of all kinds. Included in this total was a large conveyor belt plant, completed in 1951, and a new adhesives plant, opened in 1959.

Sees Tire Growth

► Speaking before the New England Association of Independent Tire Dealers in Boston, Mass., Karl O. Nygaard, manager of the wholesale staff of the Tire Division of B. F. Goodrich Co., Akron, Ohio, predicted that shipments of replacement passenger tires by 1965 will be up 10 per cent over this year's estimate of 71.5 million units. Mr. Nygaard stated that the industry can expect to ship 79 million passenger tires for this market in 1965. He attributed a steady increase in the number of cars on the road as the major factor in expanding this market. Mr. Nygaard added that truck tire shipments are expected to grow by 12 per cent by 1965, amounting to 10.5 million units.

M. M. Kahn

William Wade

Appointed by Acme-Hamilton

► Acme - Hamilton Manufacturing Corp., New York, N. Y., has appointed Marvin M. Kahn, vice-president of the firm, as director of research, development and engineering, and has elected William Wade as a vice-president and technical director. The firm has also elected Peter J. Marcello, vice-president in charge of operations, as a director of the firm, bringing the number of board members to eight.

Mr. Kahn is a graduate of the Massachusetts Institute of Technology, and a holder of several patents on new products and processing equipment. He has been responsible for the development of many of the new mechanical rubber products introduced by the company. Mr. Wade is a graduate of Bates College. Prior to joining Acme-Hamilton in 1954, he served in the Technical Department of the U. S. Rubber Co. for 19 years. Mr. Marcello had served in the rubber industry in various capacities before joining Acme-Hamilton 15 years ago. He is vice-president in charge of the firm's New York Rubber Division.

Firestone Curing Process

► Firestone Tire & Rubber Co., Akron, Ohio, has developed a tread pattern located on the inside of a tire which is the result of a new tire curing process. According to the company, the process utilizes an engraved bladder to insure uniform contact pressure over the inner surface of the tire during molding. This geometric pattern on the exterior surface of the bladder is attained by means of a photo-engraving process developed by the company. The engraved bladder will allow any air trapped between the bladder and tire to escape through the patterned channels. Firestone reports that this eliminates the possibility of ply separation caused by trapped air being driven into the cord body of the tire during the curing process. Use of a tread pattern inside the tire will result in a safer, cooler operating tire, the company states.

Carbon Black Unit Opens

► The new carbon black plant of United Carbon France S.A., Port Jerome, France, has begun commercial production of HAF, ISAF and FEF carbon blacks. The $5 million unit has an annual capacity of 50 million pounds of furnace black, used principally in the manufacture of tires and mechanical rubber goods. The plant is reported to be the first in the common market to use fuel oil as a raw material, eliminating the necessity of being located near a source of natural gas. Dewey D. Billodeau, formerly assistant quality control superintendent at United Carbon Co., Houston, Texas, has been appointed plant manager of the Port Jerome unit. George Webster, president and general manager of United Carbon France will direct plant operations, and A. G. Treadgold will serve as vice-president of manufacturing.

Second Annual Technical Conference Held by TLARGI in Los Angeles

By M. E. Lerner

► An enthusiastic group of approximately 160 members and guests attended the Second Annual Tlargi Foundation Technical Conference. The Conference was held in the Hotel Mayfair in Los Angeles, California, on June 7 and 8. It featured the presentation of eight technical papers, all previously presented at meetings of domestic and overseas rubber technical organizations during the past year and all carefully selected by a special committee. The objective of these conferences is to give rubber technologists on the West Coast the opportunity to hear some of the better papers prepared by various authorities and to participate in open discussion.

Eight Papers Given

Titles and authors of the papers presented at the Conference (abstracts of which have appeared in previous issues of RUBBER AGE) were as follows:

"Ethylene-Propylene Rubber," by I. O. Amberg and A. E. Robinson, Hercules Powder Co., Inc., Wilmington, Del. (Presented by Mr. Amberg).

"Factors Affecting the Weather Resistance of Hypalon," by P. A. Peffer, Jr., and R. R. Radcliffe, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. (Presented by B. W. Fuller).

"Modern Nitrile Rubber Technology," by I. W. E. Harris and H. A. Pfisterer Polymer Corporation, Ltd., Sarnia, Ontario, Canada. (Presented by Mr. Pfisterer).

"Low Temperature Rheology of Silicone Elastomers," by D. B. Braun, Union Carbide Corp., North Tonawanda, N. Y. (Presented by Mr. Braun).

"The Pico Abrasion Test for Rubber Compounds," by E. B. Newton, H. W. Grinter and D. S. Sears, B. F. Goodrich Co., Brecksville, Ohio. (Presented by Mr. Newton).

"Determination of Dynamic Properties of Elastomers by High Speed Stress Relaxation," by R. M. Cardillo and W. W. Gleason, Enjay Laboratories, Linden, N. J. (Presented by Mr. Cardillo).

"Carbon Black Structure and Their Effects in Elastomers," by T. D. Bolt, E. M. Dannenberg, R. E. Dobbin and R. P. Rossman, Cabot Corporation, Boston, Mass. (Presented by Mr. Dannenberg).

"Modern Role of the Electron Microscope in Rubber Research," by W. A. Ladd and M. W. Ladd, Ladd Research Industries, Inc., Roslyn Heights, L. I., N. Y. (Presented by Dr. W. A. Ladd).

Sponsored by the Los Angeles Rubber Group, of which Mel Anderson (Gross Manufacturing) is currently chairman, and typical of the activities of this group, the Conference was exceptionally well organized, with attention paid to the important details. For example, preprints of all eight papers were furnished to all attendants on registration. The two moderators — Raymond B. Stringfield (Fullerton Manufacturing), at the June 7 session, and Dr. E. G. Partridge (Tlargi Foundation), at the June 8 session —led spirited discussions after every paper.

The meeting room facilities at the Hotel Mayfair were good and most

First Technical Session speakers and moderator: back row, left to right—L. O. Amberg (Hercules Powder); R. B. Stringfield (Fullerton Mfg.), moderator; H. A. Pfisterer (Polymer Corp.); front row, left to right—D. B. Braun (Union Carbide) and B. W. Fuller (DuPont).

Second Technical Session speakers and moderator: back row, left to right—E. B. Newton (Goodrich); Dr. E. C. Partridge (USC), moderator; E. M. Dannenberg (Cabot); front row, left to right—R. M. Cardillo (Enjay) and W. A. Ladd (Ladd Research).

of the well-prepared slides used in conjunction with the papers reflected well against a wall screen. A stenotypist was in attendance to record the discussions, all of which will be made available by the group. Identification cards were supplied to all registrants and framed certificates of appreciation were presented to each author.

A special luncheon was held on June 7 at the Mayfair for officers of Tlargi, committee members, authors, and a few guests. A special trip to the Tlargi Rubber Foundation Laboratory, located in the Petroleum and Chemical Engineering Building on the campus of the University of Southern California, was arranged for the afternoon of June 8. After a brief excursion through the various laboratories and offices, a demonstration of the Pico abrasion testing instrument was given by Mr. Newton.

Conference Committee

The two-day conference, which bids fair to becoming an annual institution at Los Angeles, was arranged by a Conference Committee headed by D. C. Maddy (Harwick Standard Chemical) as chairman. Other members of the committee included: J. W. Arensmeyer (Ratliff Rubber); John G. Augenstein (Kirkhill Rubber); R. E. Bitter (Naugatuck Chemical); Don Carr (Enjay Chemical); Merle Goodwin (Goodyear Tire); J. G. Jelinek (Parker Seal); Herman Libkind (MacClatchie Manufacturing); E. G. Partridge (Tlargi Foundation); F. S. Rostler (Golden Bear Oil); B. R. Snyder (R. T. Vanderbilt); R. D. Sullivan (Shell Chemical). The late Harry Fisher was also a member of the organizing committee.

The Conference was followed by a three-day outing at the Stardust Hotel in Las Vegas, Nevada. Details on the outing will be reported in our next issue.

Moderators Stringfield and Partridge discuss the technical program with A. C. Engersall, dean of the College of Engineering at the University of Southern California.

G. D. Jackson

B. E. McCardle

Transferred by Dewey and Almy

► Dewey and Almy Chemical Division of W. R. Grace & Co., Cambridge, Mass., has made two changes in sales territories. Glenn D. Jackson III, formerly responsible for Georgia and Florida, will serve Pennsylvania, Maryland, Delaware, and Virginia. He will be located in Wayne, Penna. Billy E. McCardle, formerly responsible for Texas, Oklahoma, Louisiana, Arkansas, Mississippi, and western Tennessee, assumes responsibility for Florida, Georgia, Alabama, and eastern Tennessee. He will be located in Decatur, Georgia. The company states that the changes were made to improve service to customers in the synthetic rubber and adhesives, paint, paper, and textile industries.

Cabot Names Two

► Cabot Corp. has announced two executive appointments in its western region, located in Pampa, Texas. R. E. Dobbin has been made general superintendent for carbon black manufacturing in the region's Carbon Black Division, and N. Dudley Steele has been appointed director of research, development and technical service. Mr. Dobbin graduated from Northeastern University in 1940 and joined Cabot that year. Since then, he has held a number of positions in the Research and Development Department of the company, serving most recently as director of research and development of the western region. Mr. Steele joined Cabot in 1932 after graduation from the University of Denver. He has held positions in the research and production departments of the company's southwest operations. He was most recently employed in the Production Department of the western region's Carbon Black Division.

Buffalo Holds Golf Outing

► The Buffalo Rubber Group held its annual golf outing at the Lancaster Country Club on June 13, 1961. Golf trophies were awarded to Gene Becker (General Tire) for his low gross score of 82; E. Helmbrecht (Hewitt-Robins) for his high gross score of 133; and to Nick Johnson (Socony Mobil) for the longest drive (265 yards on the 10th hole). The steak dinner was attended by 132 persons.

Appointed by Emery

► Robert S. Haley has been named sales manager of the Vopcolene Division of Emery Industries, Inc., Cincinatti, Ohio. He will be responsible for the sales of all products of the division, including products formerly distributed by the Evanstrom Co. and B. F. Dougherty Co. Mr. Haley had formerly handled sales for Emery's Organic Chemicals Division in the New York-New Jersey area.

Goodrich and U. S. Rubber Sign New Labor Contracts

► B. F. Goodrich Co., Akron, Ohio, and the United States Rubber Co., New York, N. Y., have signed new master contracts and wage agreements with the United Rubber Workers union, thus assuring labor-management accord in the rubber industry for the next two years. Goodyear, General Tire & Rubber Co., Firestone Tire & Rubber Co., and Seiberling Rubber Co. have already signed similar labor contracts with the URW, granting wage increases and extending supplemental unemployment benefits.

Covers 25,000 Workers

The U. S. Rubber wage agreement, covering 25,000 workers, calls for a 7½ cent per hour increase for employees of the company's five tire manufacturing plants located in Chicopee Falls, Mass., Detroit, Mich., Indianapolis, Ind., Eau Claire, Wisc., and Los Angeles, Calif., effective June 5. An additional 7 cents an hour pay rise for these workers will go into effect on June 11, 1962.

Employees of 12 non-tire manufacturing plants, will receive a wage increase of 3½ cents per hour, effective June 5, and an additional 4 cents per hour effective June 11, 1962. These 12 plants are located in Naugatuck, Conn., Woonsocket and Providence, R. I., Mishawaka, Ind., Philadelphia, Penna., Santa Ana, Calif., Chicago, Ill., North Bergen and Passaic, N. J., and Painesville, Ohio.

Contract Provisions

The master contract signed by the union and the company calls for an increase in supplemental unemployment benefits, extending payments to a maximum of $5.00 per week, and lengthening coverage from 26 weeks to 39 weeks. The agreement also calls for three weeks vacation for employees after ten years of service, and four weeks vacation after 22 years of service, an additional paid holiday—the eighth for union employees, and special provisions for job protections and grievance procedures. Both the master contract and wage agreement expire on June 1, 1963.

The Goodrich settlement, last to be reached among Akron, Ohio, rubber companies, follows the industry pattern set by the other five major companies. It provides for a wage boost of up to 14½ cents an hour over the next two years, affecting 11,500 employees in eight Goodrich plants. Over 7,000 workers in Akron, and in Oaks, Penna., Tuscaloosa, Ala., Miami, Okla., and Los Angeles, Calif., will receive a wage increase of 7½ cents an hour, retroactive to June 5, and an additional 7 cents an hour, effective June 11, 1962. Workers in plants in Riverside, N. J., Marion, Ohio, and Clarksville, Tenn., will receive 3½ cents an hour, retroactive to June 5, and another pay rise of 4 cents an hour, effective June 11, 1962. As in the other labor-management contracts, tire plant workers received the biggest increases, to help keep the rubber industry's non-tire products competitive.

SUB Improvements

The SUB improvement incorporated in the contract provides for extension of benefits from the previous 26 weeks to 39 weeks, and grants a maximum weekly benefit increase of $5.00. Workers with at least five years of service, who are laid off for more than two years, are eligible for optional separation awards in a lump sum.

The new Goodrich vacation program provides for four weeks after twenty two years of service, and three weeks after ten years. Previously, it had been four weeks after twenty five years, and three weeks after eleven years. An eighth paid holiday, to be decided on a local plant basis, has also been granted. Other contract changes involved liberalization of vacation qualifications, liberalization of qualifications for holiday pay, improvement in the method of payments of funeral leave pay, liberalization of leave-of-absence procedures, and improved jury duty pay.

Still to be settled are supplemental contracts for the various Goodrich locals, but problems in these agreements are not expected to be company-wide. The new contract, which expires in April, 1963, is still subject to ratification by a majority of locals, representing a majority of the members.

In other labor-management negotions still in progress, the Perry Rubber Co., Massillon, Ohio, and the Mohawk Rubber Co., Akron, Ohio, are reported to be no nearer a settlement with the URW. United Rubber Workers Local 6, containing 600 members, turned down a new two-year contract with the Mohawk Rubber Co. for the second time, and voted to strike unless some controversial items in the contract were solved. A labor spokesman said that members objected to contract terms for piecework rates, overtime, and transfers.

Perry Rubber Disputing

The Perry Rubber Co. has announced that it would continue to insist that URW Local 601 does not represent a majority of the company's employees, and would take its battle with the URW to Federal Court if necessary. Previously, National Labor Relations Board trial examiner John P. von Rohr had ruled that by refusing since last August 15 to bargain with the URW, the company has engaged in unfair labor practices as defined in the Taft-Hartley Act.

The NLRB report called on Perry Rubber to bargain collectively with Local 601 for "wages, rates of pay, hours of employment and other conditions." An exception to this report, filed by Perry Rubber, means that the NLRB in Washington must make a ruling in the case. The company states that it will not meet with the United Rubber Workers union "until it is established by a National Labor Relations Board election that Local 601 is the representative of the employees."

Fire Hits Smithers Unit

► A blaze which raged out of control for two hours has caused an estimated $165,000 worth of damage to the main plant of the V. L. Smithers Manufacturing Co., Kent, Ohio. While the main plant was completely destroyed, three other buildings were saved by firemen, including a shed containing chemicals. The 35-man work force had gone home several hours before the first alarm was sounded. Vernon L. Smithers, president of the company, announced that the firm would rebuild immediately.

Summer Outing Held by Rhode Island Club

► The Rhode Island Rubber Club held its Annual Summer Outing and Golf Tournament on June 8, 1961, at the Pawtucket Country Club, Pawtucket, R. I., with over 250 members and guests attending. The main event of the outing was an 18-hole golf tournament. Dick Stimets (United Carbon) won the low gross first prize, and was closely followed by George Malo (Meyman Blade), Fritz Malcom (Titanium Pigment), Lyle Longworth (Monsanto), and P. A. Uva (Avon Sole). Low net first prize winner was W. Stone (Kleistone Rubber), followed by Robert Van Amburgh (Davol Rubber), C. K. Mullin (C. K. Mullin), W. M. Shehan (Witco), and J. McMahon (Carr Mfg.).

Finishing 1-2-3 in a red-hot putting contest were "Eagle Eye" Bill Drake (Union Carbide), Urb J. Malo (Narragansett Wire), and Lee Kingsford (Acushnet Process). Awards were made to Joe Cullen (Marbon) for being closest to the pin on the 7th hole, and to Ralph Allen (Heveatex) for being the most accurate on the 160-yard 15th hole. Clem Damicone (Acushnet Process) uncorked the longest drive of the day on the 18th hole, with the ball carrying 300 yards off the tee.

Most Honest Golfer

Jack Ryan (Archer Rubber) was rewarded for being the most honest golfer. When the final scores were tallied, it was found that he had taken and counted more strokes than anyone else.

E. L. "Doc" Hanna, retired technical manager of Davol Rubber Co. and a charter member and former chairman of the Rhode Island Rubber Club, was the honored guest of the day. He participated in the golf tournament and managed to break a 100. Prizes were awarded during a dinner which followed the day's events. A raffle was held and Frank Securo (Thompson Chemical & Apex) won a set of matched irons.

Outing Committee

Serving as co-chairmen of the outing were Clem Damicone (Acushnet Process), Joseph Donahue (Goodyear), and Joseph Vitale (Crescent Co.). Assisting the chairmen were Vincent Casey (J. M. Huber), Tom Crosby (H. Muehlstein), and Ed Uhlig (U. S. Rubber).

J. P. Fuller

Named Sales Manager

► The Elastomer Chemicals Department of Du Pont de Nemours International S.A. has appointed Joseph P. Fuller as sales manager and John J. Lawless as technical sales representative. Mr. Fuller will be responsible for sales of elastomers and rubber chemicals in Europe and other areas covered by Du Pont de Nemours International. The company states that the appointments were made to provide additional sales and on-the-spot technical assistance to its distributors and customers in Europe.

A graduate of New York Technical Institute, Mr. Fuller began his career in 1939 as a wire and cable specialist with the General Cable Corp. He has served with DuPont in the United States for the past 14 years, first as a rubber chemist and later as a technical sales representative, specializing in sales to the wire and cable and technical rubber goods industries. For the past two years, he has been assistant manager of the elastomer sales office at Trenton, N. J. Mr. Lawless, a graduate of the Drexel Institute of Technology, had formerly served with the U. S. Rubber Co. as a rubber technologist before joining DuPont in 1953. He has served as a technical sales representative in the United States for the past seven years, after working in the Elastomer Development Laboratory.

► "Fast Curing Accelerators for Neoprene," a brochure describing physical properties and curing characteristics of Pennzone B and Pennzone E is available from Pennsalt Chemical Corp., Philadelphia, Pa.

Asks Census Bureau To Tally Import Data

► Congressman John Brademas (Dem., Ind.) is asking that the U. S. Census Bureau keep better track of imported rubber footwear. Representative Brademas states that without detailed statistics showing the imports of the different types of footwear, the domestic industry is seriously handicapped in proving to the Tariff Commission that its products are "like or directly competitive" with the import complained of. Since the Census Bureau does not keep detailed breakdowns on imports of rubber footwear by type, no domestic manufacturer is able to prove to the satisfaction of the Tariff Commission that imports are harming the domestic industry, he pointed out. Representative Brademas would like the Census Bureau to keep separate tallies on the following types of footwear:

(1) Rubber-soled shoes with fabric uppers, such as tennis shoes, bals, and oxfords; rubber-soled shoes with fabric uppers (other than tennis shoes, bals, and oxfords), such as specialty shoes (including women's casuals); rubber-soled shoes with toya cloth uppers; rubber-soled shoes with plastic uppers (including vinyl film uppers);

(2) Rubber boots; gaiters and arctics; rubber shoes; zories, waterproof shoes with plastic uppers (including vinyl film uppers).

Manhattan Fetes Pioneers

► The Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., recently held the largest dinner in its history for members of the Manhattan Pioneer Organization, comprised of employees with 25 or more years of service with the firm. The dinner was attended by over 600 active veterans, out of a total of 908 members. Members of the 1961 class received 25-year certificates and gold lapel pins, honoring their years of service with the company. The dinner also honored two members completing 50 years of service. James J. De Mario, advertising and publicity manager, and Richard F. Teeling, northeast regional sales manager, were presented with their awards by J. H. Matthews, executive consultant. An address by John F. D. Rohrbach, president, and one by Joseph N. Kuzmick, vice-president and division manager, were other highlights of the event.

New York Group Holds Annual Outing

► Over 250 members and guests attended the Annual Summer Outing of the New York Rubber Group, held on June 1, 1961, at Old Cider Mill Grove in Union, N. J. The day's activities consisted of 10 events, with first and second prizes awarded for each event. In addition, points were compiled for all game contestants, and three grand prizes were awarded to the top scorers.

Art Donofrio (Toscony) and John Schon, Jr. (J. Schon Tool & Machine) were tied for first place. A coin toss was won by Mr. Donofrio, and he received the high score first prize of a $100 Savings Bond. Mr. Schon was given the second high score prize of a $50 Savings Bond, and the third place prize of a $25 Savings Bond went to Ray Kearsley (Thompson-Weinman).

First and second prize winners for the ten events were: *Quoits,* William F. Lamela (Okonite) and George J. Ziarnik (Esso Research & Engineering); *Bocci,* Jack E. Callan (Columbian Carbon) and Paul Melore, and K. E. Chester (C. P. Hall) and Herbert H. Watjen (Vansul Colors); *Basketball,* Edward M. Berberian (Columbian Carbon) and Joseph Brandi (Cooke Color); *Darts,* Ray Kearsley (Thompsan-Weinman) and H. J. Emore (Phillips Chemical); *Fly Casting,* John A. Stipak (Columbian Carbon) and C. Sheets; *Hit-the-Bottle,* Louis McDonald (Kelite Corp.) and A. M. Gessler (Esso Research & Engineering); *Baseball Pitch,* John Schon, Jr. (J. Schon Tool & Machine) and James V. Fusco (Enjay Chemical); *Egg Throw,* Art Donofrio (Toscony) and T. Librie (Toscony); *Golf Pitch,* R. Hunt and W. B. Curtiz (Naugatuck Chemical).

Four teams participated in a softball tournament and prizes were awarded to the following members of the winning team: Richard Stimets (United Carbon), Ronald M. Mineo (Enjay Chemical), Robert E. Clayton (Esso Research & Engineering), Roger J. Daly (Columbian Carbon), George Smolka (Pantasote), Art Donofrio (Toscony), Bruce Throsberg (Dow Corning), Eli A. Robinson (Collette Mfg.), John Schon, Jr. (J. Schon Tool & Machine), and Werner C. Schon (J. Schon Tool & Machine).

Serving as co-chairmen of the Outing Committee were A. M. Gessler (Esso Research & Engineering) and Jack E. Callan (Columbian Carbon). Members of the Outing Committee, who supervised the events, were: *Softball,* Jim Fusco (Enjay Chemical); *Quoits,* Bill Lamela (Okonite); *Bocci,* Glenn Vickery (General Tire); *Basketball,* Dick Glidden (Ames Rubber); *Fly Casting,* Bob Lukacik (Pennsalt); *Baseball Pitch,* Jack Briggs (Esso Research & Engineering); *Golf Pitch,* Woody Woodward (DuPont); *Darts,* Stan Shuart (Enjay Chemical); *Hit-the-Bottle,* Ralph Ambrose (Rodic Rubber); *Egg Throw,* Bill Hartmann (Laurie Rubber Reclaiming).

Food and refreshments were served during the course of the day, and prizes were awarded to event winners after the group enjoyed a roast beef dinner.

New York Rubber Group officers and co-chairmen of the group's Annual Summer Outing. Left to right: *Sergeant-at-Arms,* Wilbur Birkitt (Passaic Rubber); *Vice-Chairman,* Ralph DeTurk (Beckham Co.); *Outing Committee Co-Chairman,* Jack E. Callan (Columbian Carbon); *Chairman,* Henry J. Peters (Bell Laboratories); *Outing Committee Co-Chairman,* A. M. Gessler (Esso Research & Engineering); *Secretary-Treasurer,* R. G. Seaman (Rubber World).

Vodra Addresses Akron Salesmen

► Vic Vodra, technical director of Rubbermaid, Inc., Wooster, Ohio, spoke on the subject "Never Forget John Smith" at a meeting of the Akron Rubber Chemical Salesmen's Association, held on April 28, 1961 in Akron, Ohio. The main theme of Mr. Vodra's talk was—to sell John Smith what John Smith wants to buy. He explained that a sales representative has to see through John Smith's eye. People are not alike, he added, they have different interests and must be appealed to in varying ways. He pointed out that a purchasing agent, for example, might be interested in advantages in freight rates or combination shipments, whereas a technical man might be interested in improved quality or better processing. According to Mr. Vodra, both should be profit minded and if some are not, the sales representative should so orient them.

Even within these categories, the speaker explained, people do not think alike and the sales representative must plan his attack with a customized sales approach for each individual. He cautioned that this must be done in advance and not "played by ear." He said that in planning his customized approach, the sales representative must be able to communicate in terms of his listener's interests, and he must also be able to talk in his customer's language.

Mr. Vodra brought up the point that a call should be made worthwhile since the customer's time is valuable and wasting this time is costly to both customer and sales representative. He commented that advance appointments are very valuable, which ties in with planning the approach. Mr. Vodra also commented, not altogether favorably, on the habit of some suppliers who do not adequately train their own men but would like the customer to train and educate him.

New Allied Chemical Unit

► Allied Chemical Corp., New York, N. Y., has acquired a plant in Norwegian Township, two miles west of Pottsville, Penna. The twenty-seven-acre tract and plant, which includes two buildings, was acquired from Landis Tool Co. The new facility will be Allied Chemical's first to produce plastic films.

Congress Hears RMA Highway Plan

► Ross R. Ormsby, president of the Rubber Manufacturers Association, in testimony before a recent meeting of the Senate Finance Committee, declared that the rubber industry's plan for completing the Federal Highway Program on schedule and without any increase in use taxes would require less money than other proposals. Speaking on behalf of the manufacturers of tires, tubes and tread rubber, Mr. Ormsby stated that under the industry's plan, Congress would have to provide only $339 million annually to complete the program on schedule in the next 11¼ years. He pointed out that General Fund appropriations for highway purposes had averaged $600 million annually for the five years prior to adoption of the 1956 Act.

Money to General Fund

Mr. Ormsby also noted that $22.6 billion of the $60.5 billion which automotive excise tax payers will pour into the Government in the next 11¼ years, will go into the General Fund. He said that only $3.8 billion of the General Fund portion of these taxes would be needed to balance the entire Federal Highway Program, leaving $19 billion for other non-highway Federal programs. Adoption of the industry plan would enable Congress to settle financing problems for the life of the program and put an end to the recurring highway money crises, without any tax increase.

In his conclusion, the RMA spokesman registered the rubber industry's vigorous opposition to the proposed excise tax increases of 25 per cent on tires, 11 per cent on tubes, and 66⅔ per cent on tread rubber, contending they would place "an inequitable burden on all the customers of our industry."

Mohawk Opposes Tax

T. C. Johnson, general sales manager for the Mohawk Rubber Co., Akron, Ohio, put Mohawk on record as being strongly opposed to the proposed excise tax increase on tires, tubes, and tread rubber. He said that Mohawk acknowledges the need for funds to continue the Federal highway expansion program. The opposition "is not voiced against the tax increase *per se*, but rather against the disproportionate structure." According to Mr. Johnson, Mohawk feels that the proposed increase would severely penalize this segment of American industry that can ill afford such drastic increases.

He noted that the hike from 3 to 10c per pound in the tread rubber tax would mean an increase of 233 per cent. This means the tax would be equal to between 30 to 40 per cent of the total cost of a pound of tread rubber. Mr. Johnson pointed out that the retread industry is a major supplier to the motoring public. In the decade from 1950 to 1959, a total of 247 million passenger car and truck tires were retreaded.

"The proposed tax increase," he remarked, "would not only halt this annual growth of about 7 per cent, but might very well reverse the trend."

Space Suit Inflates

► Lt. Commander Alan B. Shepard, Jr., the first American to enter space, wore a 20-pound aluminized nylon and rubber suit, designed to provide him with an artificial environment similar to the earth's atmosphere in the event the space capsule's pressurizing system should fail. The garment, selected by the National Aeronautics and Space Administration, was made by the B. F. Goodrich Aviation Products Co., Akron, Ohio. Designed specifically for Project Mercury, the suit is a modified version of the U. S. Navy pressurized flight suit developed by Goodrich and the Navy. The garment was also designed to provide flotation in the event the astronaut had to "ditch" his capsule in the ocean, and to provide "air conditioning" for the astronaut in flight. Oxygen is pumped into the suit through a waist connection, circulated about the astronaut's body, then fed into the helmet for breathing. Exhaled breath escapes through a special vent in the helmet.

National Plastics Show Displays New Products

► Latest developments in plastic materials, products, and processing machinery were displayed at the 9th National Plastics Exposition sponsored by the Society of the Plastics Industry, Inc., held from June 5 to June 9 at the New York Coliseum in New York City. Some 35,000 visitors came to see the 260 exhibits representing the United States, Canada, Great Britain, Germany, Italy, Switzerland, and other overseas countries.

A noteworthy trend in the extruder industry was the offering of extruders specially adapted to the requirements of specific processes, such as blow molding, a modern version of the ancient art of glass-blowing. Of particular interest is the all-plastic shipping container, produced by the blow-molding technique, and designed for use where chemical and corrosion resistance is essential and where savings in weight are important. The containers, a lighter version of the metal drum, are made from high-density polyethylene.

Another development in processing machinery is the injection molder with screw plasticizing. These molders are, in a sense, combinations of extrusion and injection molding. Instead of the conventional plunger moving resin through the heating cylinder, a rotating screw is used in much the same manner as an extruder. Screw plasticizing machines, according to the manufacturers, will mold the entire range of thermoplastics, but are particularly well suited to heat-sensitive materials, especially unplasticized polyvinyl chloride. The advantage of the screw is that unplasticized PVC doesn't have the opportunity to overheat and decompose to form hydrogen chloride.

Annual Conference Held

Held concurrently with the Plastics Exposition was the SPI 1961 Annual Conference, a series of technical sessions which ran from June 6 to 8 at the Commodore Hotel. More than 1500 members of the plastics industry registered for these sessions, at which a total of 44 papers were read and discussed. Main topics of the panel discussions were: "Plastics in Building," "Plastics in Communications," "Plastics in Machinery," "The Uses and Techniques for Fabrication of Rigid Thermoplastic Structures."

Southern Rubber Group Holds Two Symposiums in Biloxi, Miss.

By M. E. Lerner

► Approximately 225 members and guests attended the two-day meeting of the Southern Rubber Group held at the Buena Vista Hotel in Biloxi, Mississippi, on June 23 and 24. The registration figure does not include some 100 wives and 85 children present at the resort hotel. The meeting featured two separate panel presentations, the first covering "Antioxidants, Antiozonants and Waxes" and the second "Stereo Specific Polymers." Other features included announcement of new officers, a business session, a golf tournament, and the usual group banquet.

The new officers, selected by mail ballot, are: *Chairman*, Roswell C. Whitmore (Better Monkey Grip); *Vice-Chairman*, John Galloway (DuPont); *Treasurer*, Allen B. Craig, Jr. (Witco Chemical). Also elected as directors were Jim Snyder (Columbian Carbon), representing the suppliers, and Monroe Mirsky (Wyatt Industries), representing the manufacturers.

Lenoir Black (C. P. Hall Co.), the retiring chairman, presided at the business session, which preceded the first technical session. Martin Samuels (Copolymer Rubber), the retiring treasurer, reported that funds were in good order, with over $3,000 in the treasury. John Galloway, membership chairman, reported that a high of 575 paid membership had been reached. John Bolt (Naugatuck Chemical), national director of the group, reported on the highlites of the recent meeting at Louisville of the ACS Rubber Division, particularly the growing educational activities. The minutes of the January 20 meeting, read by R. W. Rice (Firestone), the retiring secretary, were approved.

The first symposium, that on "Antioxidants, Antiozonants and Waxes," which was held on Friday afternoon, June 23, with Harold Thenhaus (Gates Rubber, Nashville) acting as moderator, featured four papers, one of them a last minute added attraction. Of the scheduled papers, the talk on antioxidants was given by Arthur L. Hollis, R. T. Vanderbilt Co., Dallas, Texas; that on antiozonants by A. S. Krivitsky, Naugatuck Chemical, Naugatuck, Conn., and that on waxes by Frank Wilcox, Witco Chemical Co., Akron, Ohio. The added talk was on "Evaluation of Antioxidants and Antiozonants Using the Outdoor DuPont Flex Test" by Guy Newton, E. I. du Pont de Nemours & Co., Akron, Ohio.

The Symposium on the "Stereo Specific Polymers", held on Saturday morning, June 24, which featured considerable up-to-date material, also included four papers, each devoted to one or more of the newer polymers. Moderator for this session was Dr. J. D. D'Ianni (Goodyear, Akron). The polymers covered, and the speakers on each, were:

Cis-1, 4 Polyisoprene—Dr. N. R. Legge, Synthetic Rubber Division, Shell Chemical Co., Torrance, California; Ethylene-Propylene Rubber and *Trans*-1, 4 Polyisoprene—E. L. Borg, Naugatuck Chemical, Naugatuck, Conn.; *Cis*-1, 4 Polybutadiene —Paul W. Cornell, Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, and R. S. Hanmer, Phillips Petroleum Co., Bartlesville, Oklahoma. It was pointed out that while ethylene-propylene rubber and *trans*-1, 4 polyisoprene were not actually stereo specific or stereo regular rubbers, they were included in the panel discussion because of their allied nature.

(EDITOR'S NOTE: Time does not permit any written report on the various papers presented but most of them were in the nature of review material, with some up-to-date data included. For example, Dr. Legge's paper included some interesting data on polyisoprene latex, details on which will be reported in an early issue, and Dr. Hanmer's paper included test data on the oil extension of *cis*-1, 4 polybutadiene. The latter paper will be published in full in an early issue of RUBBER AGE. Data on the other papers in the two symposiums will also be published as soon as available.)

Golf Tournament Held

Approximately 75 members and guests participated in the golf tournament held on Thursday afternoon, June 22, the day preceding the meeting at the Gulf Hills Dude Ranch, also in Biloxi. L. W. McCallum (Huber) was chairman of the tournament, which was held on the flight basis. Top championship honors went to Carl Snow (United Carbon), with James Wernersbach (Enjay Chemical) as runner-up.

Winners of the various flights, eight in all, included: C. M. White (Cabot), C. V. Dille (C. P. Hall), Al Shirey (Ludlow Plastics), John Craig (Nopco Chemical), Jim McCarthy (U. S. Rubber Reclaiming), C. E. Gehle (A. Schrader's Sons), Jack Owens (Raybestos-Manhattan), and John Bolt (Naugatuck Chemical). Runners-up included: Jim Schneider (Xylos), Mike Gobush (Monsanto Chemical), John Morrow (Sun Oil), Wheeler Bearden (Huber), Jim Martin (Textile Paper Products), Jerry Bullock (Glidden),

1961-1962 officers and directors of the Southern Rubber Group. Front row, left to right: *Chairman*, R. C. Whitmore (Better Monkey Grip); *Vice-Chairman*, J. R. Galloway (DuPont); *Treasurer*, Allen Craig (Witco); *Secretary*, R. W. Rice (Firestone). Back row, left to right: *Directors*, J. M. Schneider (Firestone); C. P. McKenna (Vector Mfg.); D. A. Reneau (United Carbon); Monroe Mirsky (Wyatt Industries).

Panelists for the symposium on Antioxidants, Antiozonants, and Waxes, left to right: Guy Newton (DuPont), Frank Wilcox (Witco); A. S. Krivitsky (Naugatuck Chemical); Harold Thenhaus (Gates Rubber), moderator: Arthur L. Hollis (R. T. Vanderbilt).

Bob Camp (Goodyear) and Richard Golden (Sun Oil).

High gross went to William J. Williams (Neville Chemical), the poker hand to J. Korose (Newport Industries), and the blind bogie to Jim Pettit (Textile Paper Products). The hole-in-one contest was won by L. W. McCallum (Huber), chairman of the tournament. As a first event, the tournament was termed a complete success and will probably be repeated in the future.

The group banquet was held on Friday evening, June 23, with Victor Boettcher, divisional sales manager, Shell Oil Co., Dallas, Texas, as master of ceremonies. Over 300 were in attendance at the banquet. After introducing various officers and directors sitting on the dais, Mr. Boettcher introduced the speaker of the evening, Mr. Max Fetty, of the advertising firm of Petty/Hundemer & Associates, of Baton Rouge, Louisiana. Substituting for the scheduled speaker, who was unable to be present, Mr. Fetty gave a most interesting and humorous talk built around the theme "Are You Having Any Fun." The talk was sprinkled with philosophical comment on current world affairs. The invocation at the banquet was given by Travis Butler (American Rubber). Lenoir Black, the retiring chairman, presided.

Other highlites at the two-day meeting included the presentation of a film on the safe handling of alkyd-activated materials, used in the manufacture of various stereo specific polymers, by the Texas Alkyd Co. This film was shown early on Saturday morning prior to the scheduled symposium. A special dinner and entertainment, including games, story telling and movies, was held for children between ages 4 and 14 on Friday evening, June 23.

A Suppliers' Hospitality Room was open before and after the banquet, with liquid refreshments and dancing. The two symposiums were arranged by Ross Whitmore, the incoming chairman, in his capacity as Program Chairman. The next meeting of the Southern Rubber Group will be held in Memphis on November 17 and 18.

Panelists for the symposium on Stereo Specific Polymers, left to right: P. W. Cornell (Goodrich-Gulf); N. R. Legge (Shell Chemical); J. D. D'Ianni (Goodyear), moderator; R. S. Hanmer (Phillips Petroleum); E. L. Borg (Naugatuck Chemical).

CIC Rubber Division To Hear Eight Papers

► The Division of Rubber Chemistry of the Chemical Institute of Canada will hold its annual conference on August 4, 1961, at the Queen Elizabeth Hotel in Montreal, Quebec, Canada. Eight papers will be presented at the conference in morning and afternoon session. D. G. Seymour (Cabot Carbon Canada) will serve as chairman of the morning technical session, and J. M. Campbell (Northern Electric) will chair the afternoon session. The latter session will deal with textiles as applied to the rubber industry. The guest speaker at the Rubber Division luncheon will be M. F. Anderson, president of the Dominion Rubber Co., Ltd., who will give a talk on "Modern Trends in the Rubber Industry."

Abstracts of the papers to be presented follow:

Improving the Ozone Resistance of Nitrile Rubber, by W. J. Abrams (Polymer Corp.). Although copolymers of butadiene and acrylonitrile are widely accepted as oil resistant rubbers, their lack of ozone resistance has limited their usefulness in certain fields. It has been shown that these polymers can be made ozone resistant without detracting from their oil resistance by blending them with polyvinylchloride. Attempts have been made to define the nature of the microchanges in the surface of nitrile rubber/polyvinylchloride specimens following ozone attack. The choice of polyvinylchloride resin and nitrile rubber and the effects of varying the ratio of rubber to resin on the ultimate properties of the blend are recorded. Typical properties are shown for different methods of blending the rubber and resin. Compounding of nitrile rubber/polyvinylchloride resin blends is reviewed and some recent applications are summarized.

Cis **Polybutadiene, by E. W. Madge (Dunlop, England).** Cis polybutadiene is an elastomer of considerable technical and commercial interest. Its behavior in a wide range of circumstances has received much attention and a number of unusual properties have been disclosed. Some of these should have been predictable, others could not have been. Unusual features associated with carbon black interaction, wear resistance, electrical, rheological and strength properties, etc., are discussed. Some of the basic reasons for the results obtained are obscure, others are examined in the paper.

Lignin as a Reinforcement for SBR in Military Pattern Tires, by T. R. Griffith (National Research Council, Ottawa), D. W. MacGregor (Bauer Bros., Ontario), and Lloyd Krichew (Army Development Establishment, Ottawa). This paper deals with recent findings resulting from continuing studies being conducted on lignin in military tire compounds via the Army's cooperative program with other government agencies and Canadian industry. Previous papers on SBR-lignin, presented

in 1957 and 1958, reported on the indoor and outdoor performance of 11.00x20, 12 PR military tires having a SBR-lignin tread, with a conventional carbon black carcass construction; lignin-rubber theory and practices also were indicated to demonstrate compound choice. The progress made in the compounding design of tread and carcass stocks will be presented, illustrating the effect of lignin loading on physical properties, acceleration system effect on processing and the consequent performance of large diameter nylon cord lignin construction tires. These tires were produced using lignin carcass and tread compounds with characteristics that have made possible the reduction of the crude rubber content from 40 to 10 per cent.

Progress in Pneumatic Tire Vulcanization, by G. D. Stevens (Goodyear Canada). The subject of tire vulcanization would not be complete without a review of the progress that has been made not only in types of equipment used for vulcanization but also the procedures. During the evolution of more efficient methods for tire vulcanization, the time required per unit has been reduced in the past 30 years for a popular passenger size from 105 minutes to less than 18 minutes while the tire size cross-section has increased from 4.75 to 7.50 inches. This improvement in tire vulcanizing efficiency has been made possible as a result of improvement in vulcanizing equipment; materials and methods used for tire mold construction; gauge reductions; and better heat conductivity of pressure container used for tire forming molding and vulcanizing as well as improvements in compounding materials and carcass cord members in the tire proper. High temperature and short time cycle tire vulcanization is essential to obtain maximum efficiency with minimum capital expenditure to meet the continually expanding range of sizes and types of tires required in today's market. At the same time, with shortened vulcanizing cycles greater accuracy and reliability of control equipment is required to safely use the most efficient procedures.

Nylon Yarns and Fabrics in Industrial Applications, by A. R. Szewczyk (DuPont Canada). Nylon applications to industrial products are discussed with particular reference to the properties of nylon yarns and fabrics which result in better performing industrial products. Some of the applications to be discussed are tires, conveyor belts, ropes, fish nets, and various products utilizing coated fabrics.

Textiles in the Rubber Industry—Rayon, by Dr. Mark Abbott (Courtaulds Canada). The properties desirable in fibers for industrial textiles as distinct from apparel and household uses will be reviewed and related to the properties of present-day rayon yarns. The industrial market for fiber is dominated by tire fabric, which consumes approximately 40 per cent of the total market. In Canada, rayon has been the major tire fabric since 1949. The improvements in rayon tire yarn to the present day and the improvements in tires these developments have permitted will be discussed. Other major industrial uses are conveyor and transmission belts, and hose.

Cotton, by D. James (Cosmos Imperial Mill). No abstract available.

Terylene, by Dr. John Little (Canadian Industries). No abstract available.

Speakers at the Connecticut Rubber Group symposium on New Frontiers of Rubber. Left to right: K. W. Brandau (Firestone); Dr. E. S. Ebers (U. S. Rubber); A. L. McMullen (Seiberling, Toronto); Dr. M. Gold (Aerojet-General); and Frank B. Smith (Naugatuck Chemical), group chairman.

CRG Holds Panel On Frontiers of Rubber

► "New Frontiers of Rubber" was the subject of a symposium held by the Connecticut Rubber Group on May 19, 1961, at the Waverly Inn in Cheshire, Conn. Karl W. Brandau, manager of compound development for the Firestone Tire & Rubber Co., served as panel moderator. Subjects discussed and their speakers were: "Elastomers as Materials of Construction" by Joseph S. Jorzcyk, vice-president of the Thiokol Chemical Co., Bristol, Penna.; "Nylon-Rayon Tires" by Alvin L. McMullen, vice-president of the Seiberling Rubber Co., Toronto, Ontario, Canada; and "Elastomers in Rocket Motors" by Dr. M. Gold, manager of propellant chemicals for the Aerojet-General Corp., a division of the General Tire & Rubber Co. Following the technical session and dinner, Earle S. Ebers, vice-president of the U. S. Rubber Co., spoke on the subject "New Frontiers of Rubber." Mr. Ebers discussed the problem of creating a climate for progress in the rubber industry.

Mr. Jorzcyk, in his remarks on elastomers as materials of construction, stated that for some years it had been predicted that plastics and adhesives would find a ready market in buildings. The advent of curtain wall construction, he pointed out, opened a number of applications for such products, however, they also generated new problems which had not been too serious with previous conventional construction methods.

Mr. Jorzcyk informed the group that a new frontier for polysulfide sealant which is presently in the development stage is the highway program. He explained that his company is presently concentrating on the use of polysulfide liquid polymers as flexibilizing copolymers with epoxy resins in repairing highways. According to the speaker the products are being used as tie-coats to bond fresh concrete repairs to old concrete; as sealers to prevent penetration of water and salt solutions; and as coatings to seal and improve the surface and to hold grit as a non-skid safety feature. He remarked that the elastomeric properties of the polysulfide polymer make a major contribution in eliminating the brittleness of the epoxy resins.

A. L. McMullen, production vice-president of Seiberling's Canadian subsidiary, outlined the technique for combining rayon and nylon cords in the construction of a tire. He told the group that the Nytex tire, in which the inner two-ply unit is of 840/2 nylon cord and the outer two-ply unit is of 1100/2 rayon cord, has undergone more than a year of testing in both Canada and the United States. Mr. McMullen reviewed the service conditions in Canada and their effect on rayon and nylon tire performance. He also outlined the properties of the Nytex tire as compared to all-rayon and all-nylon tires, as found in Seiberling's testing programs.

In his discussion on elastomers in rocket motors, Dr. Gold described the use of rubber-based propellants in solid fuel rocket engines. Much of Dr. Gold's remarks were of a classified nature and cannot be reported on at this time. However, he stated that the use of solid fuel rockets offer the United States its best opportunity to shorten the space lead of the Soviet Union.

Fill Allied Chemical Posts

► The Fiber Marketing Department of Allied Chemical Corp., New York, N. Y., has expanded and reorganized its sales staff in anticipation of increased production from two plants being constructed in Virginia and South Carolina. Robert E. Mulcahy, formerly New York regional sales manager for fiber marketing, has been appointed manager of marketing-industrial. His responsibilities will include the marketing of Caprolan nylon fiber for tire cord, cordage, coated fabrics, and a wide variety of webbing and fabrics for industrial application.

In addition, the Fiber Marketing Department has opened a new regional sales office in Akron, Ohio, with Thomas H. Tollner, formerly associated with Industrial Rayon Corp., acting as regional sales manager. Harry A. Greene, formerly a sales representative for tire and industrial accounts, working out of the New York regional sales office, has been transferred to the Akron office, and Othello Scarponi, previously associated with the Goodyear Tire and Rubber Co., will provide technical assistance to the rubber industry from the Akron office. He will be responsible for evaluating Caprolan nylon tire yarn supplied to the rubber companies.

Offers Rubber Extender

► Lipco Paste, a multi-purpose rubber extender developed by the Long Island Plastics Corp., Lindenhurst, N. Y., is said to impart added strength and durability to rubber compounds. The extender is a nylon material which also incorporates an accelerator. The company reports that the patented nylon paste, miscible with both synthetic and natural rubber, has been found to decrease molding cycle time by 70 to 80 per cent. A feature of the new product is that after the Lipco Paste has been blended with a synthetic or natural rubber compound, according to the manufacturer, the completely integrated molding mass remains stable in that state indefinitely, without hardening, giving it a virtually unlimited shelf-life. In addition, the company says, tests on molded rubber goods made with Lipco Paste, including shoe lifts, heels, typewriter rollers, and sheeting, show that the products have approximately 20 to 25 per cent more tensile strength, hardness, and elongation. Sample quantities for testing are available.

G. D. Gingold

Named by Sid Richardson

► Gilbert D. Gingold has been appointed manager of technical services, heading the newly-created Technical Service Department of the Sid Richardson Carbon Co. furnace plant, now under construction in Big Spring, Texas. In addition to his duties as technical services manager, he will serve as manager of the ISAF-HAF furnace plant's laboratory facilities. Mr. Gingold attended St. Francis College, and later earned his M.A. degree in rubber chemistry from the University of Akron. Prior to joining Sid Richardson, he was associated with the Goodyear Tire and Rubber Co. and the Naugatuck Chemical Division of the U. S. Rubber Co. During the past five years, he has served Sid Richardson in the capacity of technical service representative.

New Exchange Franchised

► It has been reported that several rubber companies have expressed an interest in being listed on the new National Stock Exchange, slated to start trading in a few months. This is the first new Exchange to receive a franchise from the Securities and Exchange Commission since the Commission was established in 1933. The Exchange was formed in response to the increased need for a place where seasoned over-the-counter stocks can be listed and traded. In the past, investors and brokers alike have had trouble learning about these companies and in following the price of their stocks. The Exchange notes that listing companies will have in the neighborhood of 150,000 shares publicly held, and about 500 stockholders.

Polymer-Blended Asphalt

► Massachusetts highway engineers, working with a research group from Naugatuck Chemical, Naugatuck, Conn., have developed a new technique for resurfacing older roads. The aim of the program is to raise the traffic safety level of aging roads, and to reduce annual maintenance costs on these roads. The new technique involves levelling the roads to remove the old-fashioned crown, and then installing a new surface of polymer-blended asphalt and aggregate. The polymer used is called Naugapol 3112. This rubber-like material is made in dry crumb form, and is mixed with hot asphalt. When as little as 3 per cent, by weight, of the dry crumbs are added to asphalt, the asphalt's viscosity and elasticity are markedly increased, according to Naugatuck Chemical. Road and laboratory tests of paving mixes made with the polymer-blended asphalt indicate that it has greater resistance to stripping, bleeding, low-temperature impact and rutting when compared with standard asphalt, the company states. In addition, accelerated tests show that it doesn't oxidize, or dry out, as quickly.

Mansfield Acquires Abel

► Mansfield Tire & Rubber Co., Mansfield, Ohio, has reached an agreement with the stockholders of the Abel Corp., Columbus, Ohio, for an exchange of Abel stock for shares of Mansfield. Abel will continue as a separate operating subsidiary of Mansfield, under the direction of its present management. Policies and personnel will remain unchanged. A joint statement released by the two companies revealed that Abel has plans that include 18 additional units, under construction or scheduled for opening within the next 12 months. The company expects to double the number of outlets in the next three years.

RTV in Pound Packages

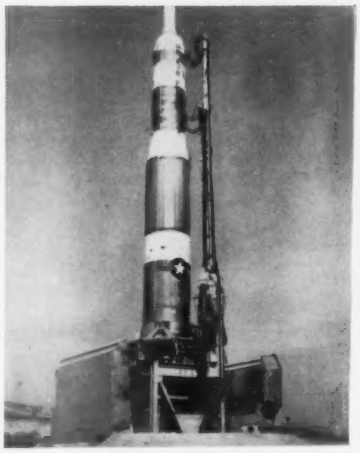
► General Electric Co., Waterford, N. Y., is marketing six grades of its RTV liquid silicone rubber compounds in single-pound quantities. The grades are RTV-11, 20, 40, 60, 88, and 90, offering users a choice of consistencies in uncured form ranging from easily pourable to stiff paste. The previous minimum quantity was one gallon.

Space Report Given On G-E Silicone Rubber

► Each time a Minuteman missile is fired literally hundreds of pounds of silicone rubber go with it, stated the General Electric Co. at a progress report press conference on "Silicones for the Space Age," held recently in New York City. One of the principle missile and space applications for its silicone materials, G-E said, is the use of heat resistant silicone rubber as a thermal insulator on certain parts of the exterior portion of missiles to protect surfaces from the extreme heat of blast-off and re-entry. G-E also reported that silicone rubber had been used extensively as a sealant on the Mercury space craft that carried the first United States astronaut into space in May, 1961.

It was also reported that silicone rubber was being used as wire and cable insulation in electrical and electronic systems of missiles as well as a potting compound and encapsulant for electrical components. In addition to their use as electrical in sulation, G-E noted that silicone compounds are also employed to protect delicate electronic compoments in space vehicles from moisture and vibration.

Recent tests, G-E said, which showed the ability of silicone rubber to operate at temperatures up to 9000°F. for short periods, explained why silicones, unlike some of the best other materials available, could offer the degree of performance required for its use on rocket nozzle and other areas of high heat exposure in missiles and space vehicles.

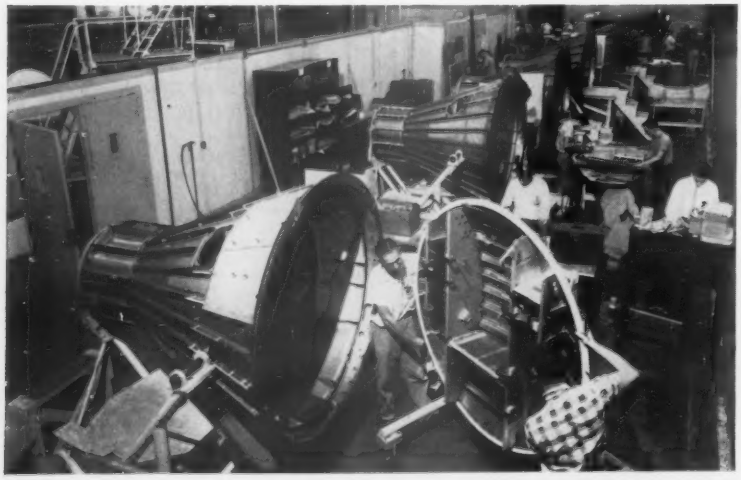


Silicone rubber compounds are used in high temperature seals for the silo doors of the Titan missile. For this application, the silicone rubber must withstand the heat of rocket blast-off as well as possible atomic attack.

The company stated that it was producing silicone rubber in two forms which were of use to the missile and space industry — both the heat cured grades and the RTV liquid silicone rubbers. According to G-E, the liquid materials, which cure to solid rubber form after the addition of a catalyst, were preferred for dipping, caulking, and spreading applications, such as in missile skirt areas, around missile section joints and probe holes, and for electronic assemblies. Fabricated silicone rubber, G-E stated, had been used in seals on missile silo doors, in instrument door seals, instrument hatch seals, nose cone forming blankets, vibration mounts, nose cone seals, diaphragms for fuel control, and guidance system mounts.

G-E also noted that other silicones, such as insulating resins and varnishes are used as coatings for printed circuit boards and in similar applications in missiles and missile ground support equipment. In addition, silicone dielectric, hydraulic, and lubricating fluids were available that were capable of performing in the space vehicles of the future.

Their unique combination of properties was cited by G-E as the reason for the selection of silicone materials for missile and space applications. It was pointed out that all silicones exhibit superior resistance to heat and cold and possess excellent electrical properties, unequaled resistance to aging, a high degree of water repellancy and good radiation resistance, which the company said often means the difference between complete functional reliability and erratic operation or failure in missile and space vehicle design.



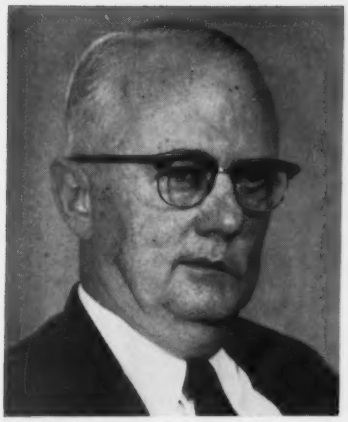
RTV liquid silicone rubber, developed by the General Electric Co., is used on the Mercury space craft around all rivets and bolts and wherever structural material on the craft requires sealing. Mercury space craft are shown above during assembly at the St. Louis, Mo., plant of the McDonnell Aircraft Corp.

Hutt Appointed

► The Chemical Division of the International Latex Corp. has appointed Henry R. Hutt as Southern regional sales manager, with offices in Atlanta, Ga. Mr. Hutt will be responsible for the sales of Tylac latices to the textile, paper, paint and adhesive industries in the states of Georgia, Tennessee, North and South Carolina, Florida, and Alabama. A graduate of Michigan State University, he had been associated with the Dow Chemical Co. and, prior to joining International Latex, was associated with Wica Chemicals, Inc., as a sales engineer.

Offer Retread Guarantee

► Firestone Tire & Rubber Co. and the B. F. Goodrich Co., Akron, Ohio, have placed a 12-month road hazard guarantee on their passenger car retread tires. The guarantees cover tire failures caused by such hazards as cuts, snags, fabric breaks and unrepairable punctures. The warranties are added to those the companies regularly make against defects in retreading material and workmanship, and are based on the percentage of tread wear.



E. B. Busenburg

Retires from Goodrich

► Earl B. Busenburg, manager of the reclaim rubber laboratories for the B. F. Goodrich Co., Akron, Ohio, has retired after nearly 40 years in the rubber industry. Recognized as an authority on the technical phases of reclaimed rubber, Mr. Busenburg joined the Philadelphia Rubber Works Co. in 1922 in its Akron general laboratories, after studying chemistry at the University of Akron. He was named chief chemist in 1929 and remained with the company when it became a part of B. F. Goodrich in 1931. During World War II, Mr. Busenburg was loaned to the government to serve on the staff of technical consultants, assisting William M. Jeffers, United States rubber director. He is a member of the Rubber Division of the American Chemical Society, a member and former chairman of the Akron Rubber Group, and has been active on the technical committee of the Rubber Reclaimers' Association.

Builds Tire Unit

► The Kelly-Springfield Tire Co. is building a new $10,000,000 passenger tire plant near Tyler, Texas, which will cover over 200,000 square feet. The single-story structure will produce about 4,000 tires annually, with output expected to double in five years. Eventually, the company hopes to produce truck and tractor tires as well. Initial production is scheduled for next March, with full production expected by the last quarter of 1962. The new facility will carry out all steps in tire manufacturing, from the purchase of raw materials to the building, curing, finishing, and shipping. All types and sizes of passenger tires will be produced.

Generally, there are three approaches by a company to the selection of a process dryer — the engineering, the economic, and the important evaluation of the intangibles. We firmly believe that SARGENT will always be found on top from every approach, for many reasons, an important one being that our machines and our people consistently deliver as promised, and more. This is the SARGENT:

- A dryer designed for your process, your required production.
- Rugged construction, trouble-free economical operation.
- Highest quality, measurably uniform drying.
- Exclusive features for efficiency and safety.
- Heat source — gas, oil, steam, electricity.
- A dryer designed for quick, easy cleanout.
- The bonus economy of the speediest, easiest installation of any machine on the market.
- Built by a company whose dryers lead the field — a company whose long experience makes a guarantee really mean something — a company that will say, "We stand unequivocally behind every machine we build."

FORMULA FOR PROFITABLE OPERATION

RUBBER DRYERS by SARGENT

PHOTO, COURTESY OF UNITED RUBBER & CHEMICAL COMPANY, BAYTOWN, TEXAS

SARGENT Single-Pass, Two-Stage Rubber Dryer

This 32-section, 2-stage master batch dryer, delivering large tonnage hourly, has a vibrating feeder, an extra-wide conveyor. Gas-fired, with each of six zones separately heated, regulated and controlled. No air recirculation through the heaters prevents contamination. Full-height hinged doors for ease of speedy, thorough cleanout. Completely automatic push-button operation and control. It meets fully the exacting, specified requirements of hourly production with complete automation, operating efficiency and the incorporation of every known safety device for the protection of personnel, machine and stock.

Another example of SARGENT advanced design and creative engineering in building a dryer that will be MODERN FOR YEARS TO COME.

C. G. SARGENT'S SONS CORPORATION

Graniteville, SINCE 1852 Massachusetts

PHILADELPHIA • CINCINNATI • CHARLOTTE • ATLANTA • HOUSTON • DETROIT
NEW YORK • CHICAGO • LOS ANGELES • TORONTO

Boston Group Holds Outing

► Nearly 650 members and guests attended the 25th Annual Summer Outing of the Boston Rubber Group, held on June 16, 1961, at the Andover Country Club, Andover, Mass. The day's activities consisted of a 9-hole and 18-hole golf tournament, as well as a putting contest, horseshoes, darts, tub and ball, and horse race. A lobster dinner was served "under the big top," a feature of the outings of the Boston Rubber Group. Above, the top photograph shows a view of the "big top." In the bottom photograph are some of the members who helped organize the outing. They are, left to right: *Tub and Ball Director,* Jim Cyphers (Boston Woven Hose); *Permanent Historian,* Harry Atwater (Malrex Chemical); *Putting Contest Director,* Tom Weaver (Columbian Carbon); *Secretary-Treasurer,* George Hunt (Simplex Wire & Cable); *Outing Chairman,* Bob Loveland (R. T. Vanderbilt); *ACS Rubber Division Director,* George Smith (DuPont); *Chairman* George Herbert (Tyer Rubber); *Softball Director,* Ted Freeman (Steadfast Rubber); and *Horseshoe Director,* Red Herthel (Goodrich). Not in photograph: *Golf,* Bill Platt (PPG).

Richardson Names Two

► Sid Richardson Carbon Co., Fort Worth, Texas, has named John M. Hogg plant manager and Grant C. Boardman assistant plant manager of its new furnace black facility now under construction at Big Spring, Texas. Mr. Hogg joined the company after graduating from Yale University in 1955, and since that time has worked as an administrative assistant to the vice-president and general manager. Mr. Boardman, a graduate of Louisiana State University with a chemical engineering degree, previously was associated with the Thermatonic Carbon Co. and the Columbian Carbon Co.

Berkman Appointed

► Texas Butadiene & Chemical Corp., New York, N. Y., has named B. D. Berkman as sales development engineer in its Polychemicals Department. Mr. Berkman will be working on market development problems involving the firm's new SMA and polybutadiene resins. Mr. Berkman received his degree in chemistry from Brown University, and his M.S. degree in marketing from New York University. He was formerly associated with American Cyanamid Co., where he had various assignments, including research, technical service, and market development.

New ADM Plasticizers

► Recently revised automotive requirements have resulted in the development of a new line of low viscosity monomeric plasticizers for vinyl compounds. Admex 752 and Admex 755, the new plasticizers available from Archer-Daniels-Midland Co., Minneapolis, Minn., are said to meet the revised standards with minimum costs and exceptional versatility in compounding. Due to greater window area, hence hotter interior temperatures in modern cars, the company explains, the new automotive requirements demand extremely low volatility as well as low temperature properties. The new plasticizers are designed to assist the compounder in producing more durable upholstery fabrics, extrusions, and moldings for all functional and decorative vinyl plastic items used in automotive interiors. The company adds that increased use of synthetic elastomers, including vinyl, for automotive interiors has led to closer evaluation of all components containing relatively low molecular weight raw materials.

Natural Rubber Demand

► According to the Natural Rubber Bureau, Washington, D. C., demand for natural rubber has outstripped production for three years in a row. In 1960, the industry produced 1,967,500 tons and sold 1,980,000 tons, roughly 12,500 tons more than available output. In 1959, the industry produced 2,067,000 tons and sold 2,112,500 tons, for a deficit of 45,000 tons. In 1958, 1,975,500 tons were produced and 1,998,000 tons were sold, or 22,500 tons more than was grown. The Bureau states that 150,000 tons of natural rubber have been released from United Kingdom and United States stockpiles, offsetting the 12,500 ton shortage for 1960.

Chemical Products Unit

► Chemical Products Corp. has started construction of a new plant, adjacent to its existing facility at Cartersville, Ga., which will manufacture a line of sodium silicates. Initial production will include most of the commonly used solution grades, one anhydrous glass and sodium metasilicate pentahydrate. Completion of the plant is scheduled for mid-October, 1961, with full scale production following shortly thereafter.

Goodrich Awarded Patent

► B. F. Goodrich Industrial Products Co., Akron, Ohio, has patented a "turnover" conveyor belt system which allows belts to twist themselves automatically, reversing top and bottom surfaces after delivering and before accepting a new load. The object of this turnover action is to position the clean side of the belt on top of the return idlers, thus preventing accumulations of tacky materials on idlers or pulleys which can damage idler equipment and shorten belt life, the company explains.

The twisting action is accomplished by placing two twist pulleys at each end of the belt flight. Each set of twist pulleys turns the belt 180 degrees. The belt's thick carrying cover is always positioned to receive the load, and the return idlers contact only the clean side of the belt. The system can be applied to any conventional conveyor system without altering the conveyor framework. It is recommended for use by Goodrich wherever a conveyor belt handles moist or wet materials such as iron, limestone or wet sand.

Grace Markets Moplen

► W. R. Grace & Co., New York, N. Y., and the Chemore Corp., New York, N. Y., general United States representative for Montecatini, Milan, Italy, have reached an agreement to cooperate in the marketing of polypropylene. Both the Polymer Chemicals Division of W. R. Grace and the Chemore Corp. will market the polypropylene produced in a new plant, now under construction at Neal, West Va., under Montecatini's trademark Moplen. The new unit is being built by the Novamont Corp. Montecatini's wholly-owned subsidiary, which is also represented in the United States by the Chemore Corp. The Novamont plant will have an initial capacity of 25 million pounds, and will go on stream in the third quarter of this year.

Ware Names Beckham

► Ware Chemical Corp., Westport, Conn., has appointed the Beckham Co., Akron, Ohio, as its technical sales representative for its entire line of rubber chemical Prespersions. Beckham personnel who will handle the Ware line in several new areas include: Ralph DeTurk, South and Southeast; James L. Weaver, Midwest; J. D. Shaw, Chicago; H. Johnson, Buffalo-Erie; and H. F. Jacober, West Coast.

J. F. Murphy

Named by American Zinc

► John F. Murphy has been appointed sales representative in charge of the Chicago, Ill., area for the American Zinc Sales Co., St. Louis, Mo. In his new post, he will supervise the company's sales and administrative activities on zinc pigments. Mr. Murphy attended St. Louis University and joined American Zinc in 1947 upon leaving the military service. He has represented the company in the midwest, south, and southwest for the past fourteen years.

Little Addresses ACS

► Dr. Julian R. Little, senior research scientist in charge of polyurethane research at the Research Center of the U.S. Rubber Co. in Wayne, N. J., spoke on the applications of polyurethane at a meeting of the St. Joseph Valley Section of the American Chemical Society on April 26 in South Bend, Ind. According to Dr. Little, polyurethane is the most wear resistant and one of the most versatile man-made materials to come out of the chemists' laboratories in recent years. He pointed out that it is possible to make either a soft, elastic type or hard plastic kind of polyurethane, and many variations between these two extremes can also be made. Dr. Little also described techniques for using the material in cushioning and in certain tire applications.

Albert Fills Post

► Edward J. Albert, chairman of the board of the Thwing-Albert Instrument Co., Philadelphia, Penna., has assumed the duties of the presidency, succeeding the late Miss Ruth Anna Jago. No changes in company policy are planned.

Tighten Down on FOAM

*with Dow Corning Silicone Defoamers**

There's a *right* tool for every job. In foam control it's Dow Corning silicone antifoamers or defoamers . . . job-proved thousands of times over as the most efficient, most economical, and most versatile foam suppressors available.

*At prescribed levels, are sanctioned by FDA

FREE SAMPLE
and new manual on foam control

first in silicones
Dow Corning CORPORATION
MIDLAND, MICHIGAN
Dept. 8619a

Please rush a FREE SAMPLE of a Dow Corning silicone defoamer for my product or process, which is (indicate if food, aqueous, oil or other): _____

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

Shell Names Three

► Shell Chemical Co., New York, N. Y., has announced three changes in the sales staff of its Synthetic Rubber Division. T. E. Starr, formerly technical sales representative at Lakewood, Calif., has been named resident technical sales representative in the division's eastern district office in Baltimore, Md. Mr. Starr is succeeded by P. W. Shaffer, formerly of the Sales Development Department at Torrance, Calif. M. D. Domenick, formerly sales analyst in the Torrance office, has been appointed technical sales representative in the central district office at Cleveland, Ohio.

Mr. Starr joined Shell in 1957 as a chemist at the Houston, Texas, plant laboratory, and later served in the same capacity at Norco, La., and in the technical service laboratory at Union, N. J. He has also been a chemist at Torrance and a sales representative at Lakewood, Calif. Mr. Shaffer joined Shell in 1955 at the Torrance plant, where he served as a chemist and technologist until he was appointed to the technical sales force early this year. Mr. Domenick started with Shell in 1955 as a chemist at the Torrance plant. He has since been a technologist in the New York export office, and a sales analyst and chemist at Torrance.

C. J. Oldenburg

Named Sales Manager

► California Chemical Co., San Francisco, Calif., has named Carl J. Oldenburg as eastern sales manager of petroleum chemicals for its Oronite Division. He will be located in New York City. Mr. Oldenburg has been with California Chemical for 17 years. His previous experience includes research in lubricating oil additives at the California Research Corp., and technical service work at Oronite's lube oil additive manufacturing plant at Oak Point, La. Prior to his new appointment, he served as Oronite's midwestern district sales manager for three years at the Chicago, Ill., office.

Future Meetings of the Division of Rubber Chemistry American Chemical Society

Date	*Place*	*Hotel*
1961		
Sept. 5-8	Chicago, Ill.	Sherman
1962		
Apr. 24-27	Boston, Mass.	Statler
Oct. 16-19	Cleveland, Ohio	Cleveland
1963		
May 7-10	Toronto, Canada	Royal York
Sept. 10-13	New York, N. Y.	Roosevelt
1964		
Apr. 28-May 1	Detroit, Mich.	Cadillac
Sept. 1-4	Chicago, Ill.	Sherman
1965		
May 4-7	Miami Beach, Fla.	Fountainbleau
Oct. 19-22	Philadelphia, Penna.	Bellevue-Strat.
1966		
May 3-6	San Francisco, Calif.	Fairmount
Sept. 13-16	New York, N. Y.	Not finalized
1967		
May 2-5	Montreal, Canada	Queen Elizabeth
Sept. 12-15	Chicago, Ill.	Sherman

Buys Cable from Canada

► The New York City Transit Authority, which recently sent formal complaints to the office of the U. S. Attorney General and the New York State Attorney General regarding the submission of identical bids, has purchased 6,120 feet of cable from a Canadian firm. The contract was awarded to the T. Pirelli Co., St. Johns, Quebec, in an attempt to break up the pattern of identical bids from American companies. The cable is being sold to the Authority under a bid of $25,704, submitted by the Pitman Electric Products Co., New York, N. Y. The Transit Authority stated that identical bids of $28,959 were submitted by the General Cable Corp. and Anaconda Wire & Cable Co. A third bid at the same figure was received from the American Steel & Wire Division of U. S. Steel Corp., it was said, but it arrived too late to be considered.

Develops High-Speed Tire

► B. F. Goodrich Tire Co., Akron, Ohio, has developed a high-speed tire designed to prevent destructive "shock waves" from building up to the point where they can cause blowouts or other failures. The tire was developed for use on police cars and other emergency vehicles. The company reports that a scientifically determined cord angle in the four-ply nylon tubeless tires is responsible for eliminating shock waves. The new Silvertown Highway Patrol tires are being produced in four sizes—6.70-15, 7.10-15, 7.50-14, and 8.00-14—to fit practically all state, county and municipal police vehicles.

Carmody Appointed

► Union Carbide Olefins Co., a division of Union Carbide Corp., New York, N. Y., has appointed Thomas W. Carmody as sales manager of the division. Mr. Carmody received his B.S. degree in chemical engineering from the Massachusetts Institute of Technology in 1946, and his M.S. degree in chemical engineering the following year from the University of Delaware. He joined Union Carbide Chemicals Co. in 1948 as a sales engineer working on activated carbon solvent recovery systems. He transferred to Union Carbide Olefins Co. as a product manager when the company was formed in 1958.

H. R. Thies

Elected IISRP President

► Herman R. Thies, general manager of the Chemical Division of the Goodyear Tire & Rubber Co., was elected president of the International Institute of Synthetic Rubber Producers at the organization's second annual meeting held recently in New York City. Mr. Thies succeeds T. L. Cubbage, vice-president of the Phillips Chemical Co. Other officers elected by the Institute are: Tara Matsuda (Japan Synthetic Rubber), vice-president of the North American section; Ludwig Bornhofen (Chemische Werke Huls), vice-president of the European section; George Hackim (General Tire & Rubber), secretary; and J. C. Roberts (Firestone Synthetic Rubber & Latex), treasurer. Bancroft W. Henderson, managing director of the Institute, was elected assistant treasurer. The Institute has announced that it will establish an office in Brussels, Belgium, as part of the expansion of its world-wide network of offices.

Kenrich Names Two

► Kenrich Petrochemicals, Inc., New York, N. Y., has elected Hermann Rogge as president, and Mr. Oscar A. Spiegelhalder as head of Kenrich International, the company's international sales division. Mr. Spiegelhalder will head the executive committee of the board of directors, on which he will serve with Mr. Rogge and the board's chairman, Martin Wright. Mr. Rogge is a graduate of Harvard College and the Columbia University School of Law. He had previously served the company in a consulting capacity, and is a member of its board of directors and those of its subsidiaries, Laribee Wire Inc., and Southwest Metal Industries.

CURING · CASTING · CALENDERING
· VULCANIZING · POLYMERIZING ·
CURING · CASTING ·
·

Patapar®

WILL GIVE *QUICK* RELEASE

(or we'll eat the Patapar!)

Take us up on our offer: Patapar Releasing Parchment will give quick, clean release, or we'll eat the Patapar. Its *purity* is a fundamental reason why this Vegetable Parchment stands up under your heating cycle, resists penetration—and then *releases*. Patapar is so pure it can't contaminate, won't leave fuzz. So pure it's sure to give quick release!

PATERSON PARCHMENT PAPER COMPANY
Bristol, Pennsylvania
NEW YORK, N.Y. CHICAGO, ILL. SUNNYVALE, CALIF.

Patapar®
RELEASING PARCHMENT

Send for pure-enough-to-eat samples of Patapar Releasing Parchment

Names in the News

Wilbur G. Malcolm, president of American Cyanamid Co., New York, N. Y., has been elected chairman of the board and chief executive officer of the company.

Edward W. Nicholson has been appointed director of the Chemicals Development Division of Esso Research & Engineering Co., Linden, N. J., and **Dr. Robert W. Krebs** has been named manager for synthetic rubber.

Dr. Herbert Lee, formerly director of sales, manufacturers and national accounts, for Lee Rubber & Tire Corp., Conshohocken, Penna., has been appointed director of sales, special accounts.

Bertram Sayer has been named to the newly-created position of manager of technical sales service at Polyvinyl Chemicals, Inc., Peabody, Mass.

John M. Collier has been named sales representative for Goodrich-Gulf Chemicals, Inc., Garden Grove, Calif.

Peter N. Lensi, formerly associated with Thiokol Chemical Corp., has joined Hummel Chemical Co., New York, N. Y., as research director.

John W. Conyers has been appointed western district sales manager of Pennsalt Chemicals Corp., San Mateo, Calif.

J. Earl Burrell has been named vice-president of operations for the Chemical Division of Pittsburgh Plate Glass Co., Pittsburgh, Penna.

Dr. James O. Weiss, formerly with DuPont, has joined the Chemstrand Corp. research center in Durham, N. C., as research chemist.

Vernon D. Dodez, Pacific region credit manager for the B. F. Goodrich Co., has been named senior financial representative in Akron Ohio, and will be responsible for the administration of financial assistance programs for all divisions of the company.

Al DuWeis has been named branch manager for the W. J. Voit Rubber Co., Portland, Ore., and **Floyd Price** has been named assistant branch manager in the Pacific Northwest, Alaska and western Canada.

Robert J. Kiechlin, previously assistant comptroller, has been elected comptroller of the New Jersey Zinc Co., New York, N. Y., succeeding **Edward E. Schwegler** who will continue as a vice-president of the company.

J. R. Powell has been named New England sales representative for the Landers-Segal Color Co., Brooklyn, N. Y.

J. W. Keener, president of the B. F. Goodrich Co., Akron, Ohio, has been named a member of the Council on the Graduate School of Business of the University of Chicago.

Jack R. Monte has been appointed vice-president of O'Sullivan Rubber Sales, Inc., Winchester, Va.

Stanley E. Moore and **Robert O. Smith** have been named sales representatives in the Pigment Division of the New Jersey Zinc Co., New York, N. Y.

Dr. Louis J. Croce has been promoted to manager of the Petro-Tex Research Department in the chemical research and development center of Food Machinery Chemical Corp., Princeton, N. J.

Charles H. Baldwin, previously general sales manager of manufacturers' products for the U. S. Rubber Co., New York, N. Y., has been appointed production manager of the company's Footwear and General Products Division.

Robert J. Cuozzo has been appointed manager of the newly created North Florida sales district of the American Mineral Spirits Co., Chicago, Ill.

Lee H. Clark, group vice-president, East, at Pennsalt Chemicals Corp., Philadelphia, Penna., has retired after 32 years with the company.

Willis McDonald, senior vice-president of Chemical Bank New York Trust Co., and a director of DeLaval Steam Turbine Co., has been elected a director of the Carlisle Corp., Carlisle, Penna.

Elmer A. Rich, III, has been named president of Lake Erie Machinery Corp., New York, N. Y., succeeding **James F. Connaughton.**

Robert H. Walsh, formerly elastomers sales manager for the DuPont Co. (United Kingdom) Ltd., London, England, has been named assistant manager of market development for DuPont's Elastomer Chemicals Department, Wilmington, Del.

Graham W. Corddry, manager of the Titanium Division of National Lead Co., New York, N. Y., and **Claude M. Merrell,** director of foreign operations, have been elected vice-presidents of the company.

Robert W. Smith, manager of field engineering for the Detroit zone of the B. F. Goodrich Tire Co., will go to The Hague, Netherlands, as European technical representative for International B. F. Goodrich Co.

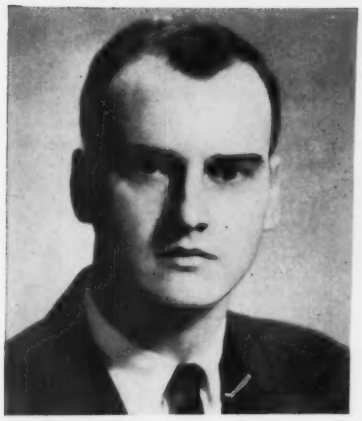
Ben Gordon, of A. Schulman Inc., Akron, Ohio, and his son **Richard S. Gordon,** of the Buffalo Paper Stock Co., Buffalo, N. Y., have both been elected to the board of directors of the National Association of Secondary Material Industries.

Douglas Mueller, formerly director of merchandising and public relations for the Seiberling Rubber Co., has joined the Borg-Warner Corp., Chicago, Ill., as director of public relations and advertising, succeeding the late **Donn Sutton.**

Henry Krakowski, formerly a chemist at Oliver Tire & Rubber Co., has joined the International Department of the United Carbon Co., Inc., New York, N. Y.

Duane Rodger, formerly with the Silicone Products Department of the General Electric Co., has joined the Cole Manufacturing Co., Palo Alto, Calif., as vice-president and sales manager.

E. C. Scott has retired from the Firestone Tire & Rubber Co. of Calif. after serving 32 years with the Industrial Products Division.



P. G. Sutton

Named Representative

► Philip G. Sutton Jr. has been appointed a sales representative for the Pigments Division of the American Cyanamid Co., and has been assigned to the Boston, Mass., office. Mr. Sutton attended Western Michigan University and was graduated from Purdue University in 1958 with a B.A. degree in chemical engineering. He joined American Cyanamid as a sales trainee shortly after his graduation and has recently been serving as assistant to the eastern regional sales manager for the Pigments Division.

Goodrich Design Center

► B. F. Goodrich Co. has established a new design center in New York City for the design, styling, and packaging of the company's products in the industrial, automotive, home furnishings, footwear, marine, and construction fields. The center is under the management of James D. Floria, recently appointed director of design for Goodrich, and a former partner of Brooks Stevens Associates, industrial design consultants. The company has announced a complete revision of its concept of design, a revision which includes styling, packaging, and retail store architecture and interior design. Under the new policy, consultant designers will be retained as required to restyle various items in the company's line of products.

► Thompson Chemical Co., Pawtucket, R. I., has added Trulon 750 and 760 plasticizers to its line of vinyl chloride-vinyl acetate copolymer resins.

Ingersoll Acquires Firm

► Ingersoll-Rand Co., Phillipsburg, N.J., has acquired the Aldrich Pump Co., Allentown, Penna., in exchange for an undisclosed number of its common shares. Aldrich will now be operated as a wholly-owned subsidiary of Ingersoll. The purchase was made, Ingersoll disclosed, as part of its diversification program. Aldrich products, representing new lines, will be distributed to a broad export market through the existing worldwide sales and service organization of Ingersoll-Rand. Robert H. Johnson, chairman of Ingersoll, was elected president of the new subsidiary. The other officers are: Vice-president and general manager, Carl H. Vaupel; Vice-president, E. J. Parish; Secretary and treasurer, R. J. Kuntz. These officers and L. C. Hopton (president of Ingersoll), Herbert S. Cresswell (vice-president), and Alfred Steel comprise the board of directors.

Offers Multi-Color Tires

► Goodyear Tire & Rubber Co., Akron, Ohio, has introduced a multi-color tire with bands of color on the white sidewall. The tires are being made available to the automotive industry, as well as to the tire replacement market on a premium basis as production schedules permit. Initially, they are being produced with bands of red or blue. The color bands are made of a specially compounded rubber containing fade-proof inorganic dye. The rubber is said to be resistant to sun and weather, and will clean as easily as a regular white sidewall.

"More production, more production . . . that's all I hear these days!"

W. R. Macy

Named by Goodrich

► William R. Macy has been named manager of the reclaim rubber laboratory of the B. F. Goodrich Industrial Products Co., Akron, Ohio, succeeding Earl Busenburg who has retired. Mr. Macy joined Goodrich in 1950 as a production management trainee, following his graduation from Iowa State University with a B.S. degree in chemical engineering. He was a foreman in various industrial products departments, before being named a senior product engineer in 1956.

Heresite Granted Patent

► A German patent has been granted to C. H. Hempel of Heresite & Chemical Co., Manitowoc, Wisc., covering a process for the production of a synthetic rubber using butadiene, styrene and acrylonitrile as basic materials. The patent was granted by the Patent Office of the German Bundes Republic and was assigned to Heresite & Chemical Co. Heresite is also the owner of the United States patent for the same process.

Wyandotte Unit Planned

► The Michigan Alkali Division of Wyandotte Chemicals Corp. will construct a new $3.5 million propylene oxide plant at Wyandotte, Mich., to meet the growing demands of the urethane and detergent markets. Propylene oxide is an important raw material used in the manufacture of chemicals for detergents and flexible and rigid urethane foams. Construction will begin within a few months.

Financial News

Lee Rubber & Tire

► Six months ended April 30: A net loss of $214,429 was reported, compared with a net income of $217,676, equal to 25c per share, for the comparable period of the previous year. Net sales amounted to $19,978,256, against $21,483,917 for the like six month period a year earlier.

St. Joseph Lead

► First quarter: Net income amounted to $598,660, equal to 22c per share, compared with $1,612,-665, or 59c per share, for the same period a year ago. Sales totaled $15,496,949, against $26,465,128 for the comparable period a year ago.

Clevite

► First quarter: Net earnings were $1,170,000, equal to 60c per share, compared with $2,316,000, or $1.21 per share, for the first quarter in 1960. Sales and other revenues totaled $22,697,974, against $25,978,-895 for the first quarter a year earlier.

Sheller

► First quarter: A net loss of $175,535 was reported, compared with a net income of $524,048, equal to 55c per share, for the first quarter of 1960. Net sales amounted to $8,157,273, against $13,888,497 for the comparable quarter a year earlier.

Simplex Wire & Cable

► First quarter: A net loss of $90,-000 was reported, compared with a net income of $116,000, or 19c per share, for the comparable period in 1960. Sales amounted to $7,726,-000, against $7,524,000 for the first quarter of the previous year.

Atlas Powder

► First quarter: Net earnings of $702,000, equal to 92c per share, compares with $664,000, or 87c per share, in the same period of 1960. Sales totaled $16,829,000, compared with $16,587,000 for the 1960 first quarter.

Air Reduction

► First quarter: Net income was $2,817,102, equal to 71c per share, compared with $4,102,826, or $1.04 per share, for the comparable period in 1960. Sales came to $48,-463,613, against $52,338,649 for the 1960 quarter.

American Viscose

► First quarter: Net income amounted to $1,834,009, or 39c a share, compared with $2,011,000, or 41c a share, for the comparable 1960 period. Sales totaled $50,315,000, against $54,825,000 a year earlier.

DuBois Chemicals

► Year ended February 28: Net income totaled $2,580,259, equal to $1.06 per share, compared with $2,344,674, or 95c per share, for the previous year. Net sales were $26,976,750, against $25,303,747 for the year ended 1960.

Union Asbestos

► First quarter: A net loss of $39,-500 was reported, compared with a net income of $2,504 for the same period a year ago. Net sales were $2,474,140, against $2,709,687 for the first quarter of 1960.

Kleinert Rubber

► For 1960: Net income was $731,-770, equal to $2.49 per share, compared with $741,345, or $2.51 per share, for the year ended 1959. Net sales totaled $15,104,696, against $14,435,949 for the previous year.

Vanderbilt Tire

► For 1960: A net loss of $1,029,-291 was reported, compared with a net income of $209,112, equal to 22c per share, for the previous year. Net sales were $18,942,181, against $20,200,546 for 1959.

Rubbermaid

► Six months ended March 31: Earnings amounted to $435,810, compared with $885,368 for the comparable period a year ago. Net sales were $13,150,560, off five per cent from the 1960 period.

Firestone

► Six months ended April 30: Net income after taxes amounted to $28,-142,824, equal to $1.04 per share of common stock, compared with $30,392,317, or $1.12 per share, for the same period a year ago. Net sales totaled $544,872,290, compared with $581,129,397 for the 1960 period.

Monsanto Chemical

► First quarter: Net income amounted to $15,508,000, equal to 57c per share, compared with $18,943,000, or 70c per share, for the first quarter of 1960. Net sales were $219,354,-000, against $226,295,000 for the same period a year ago.

National Distillers

► First quarter: Net profits amounted to $4,814,000, equal to 42c per share, compared with $6,037,000, or 54c per share, in the like 1960 period. Net sales came to $136,715,-000, against $134,318,000 for the first quarter a year ago.

American Potash

► First quarter: Net income was $1,-025,142, equal to 43c per share, compared with $1,278,319, or 54c per share, for the first quarter of 1960. Sales totaled $11,161,338, against $13,225,531 in the corresponding months of 1960.

Allen Industries

► First quarter: Net income amounted to $258,505, equal to 31c per share, compared with $462,768, or 55c per share, for the same period last year. Net sales came to $8,584,-322, against $12,785,368 for the 1960 period.

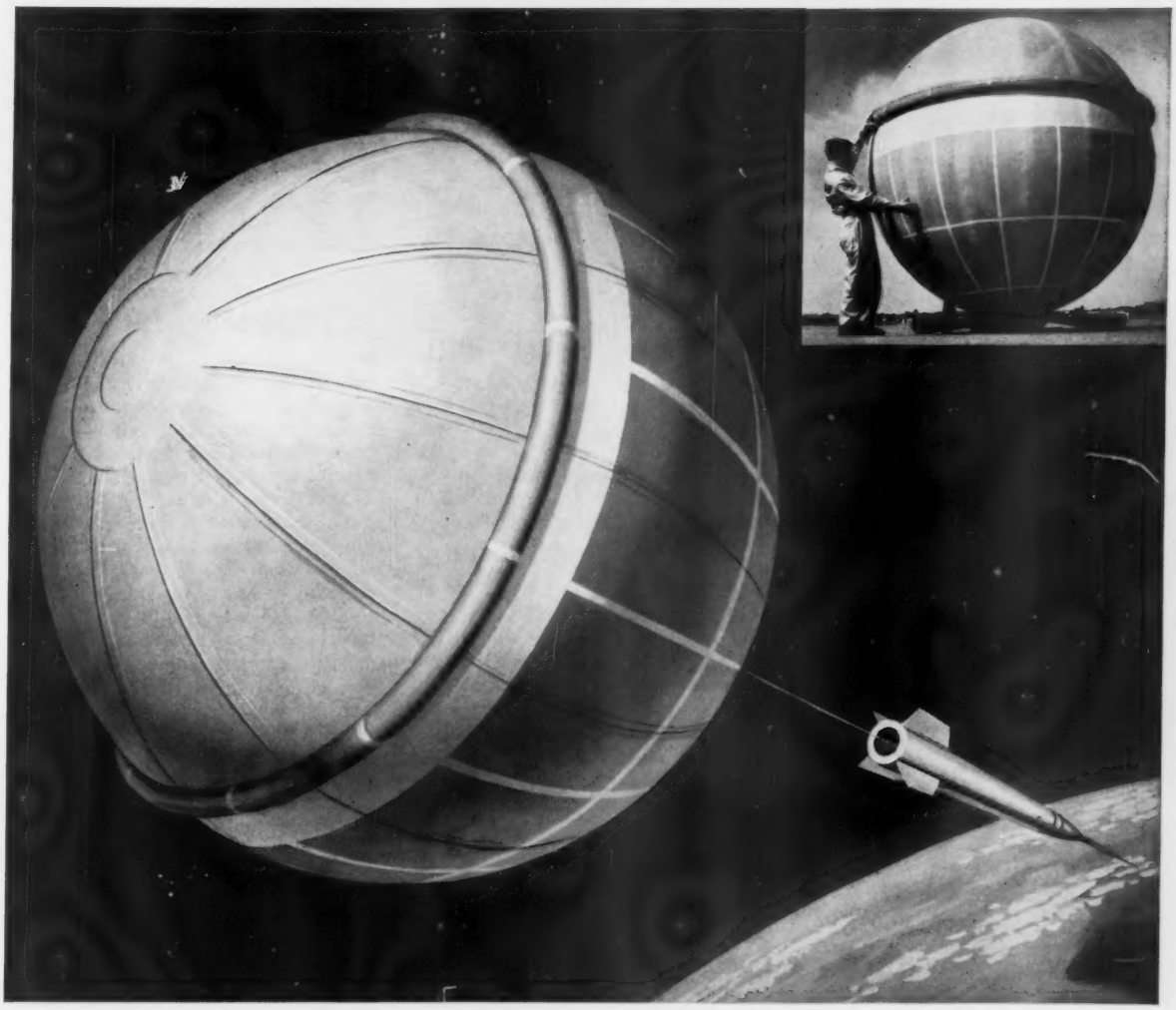
Thiokol Chemical

► First quarter: Net income totaled $1,044,398, equal to 22c per share, compared with $817,820, or 18c per share, for the comparable period a year ago. Net sales amounted to $41,948,941, against $41,996,134 for the same period of 1960.

Harshaw Chemical

► Six months ended March 31: Net income was $993,325, equal to 94c per share, compared with $918,876, or 87c per share, for the comparable period a year ago. Net sales came to $34,046,272, against $37,223,918, for the six month period of 1960.

Fabric balloon "puts the brakes" on space vehicles returning to earth



Slowing vehicles in orbit to provide safe passage down through the "heat barrier" of the upper atmosphere is one of the knottiest problems of space travel. One ingenious solution is the drag balloon developed by the Goodyear Aircraft Corporation.

Called "Ballute," this high-altitude recovery system consists of a nine-foot fabric balloon which pops out of a capsule's tail section—and automatically inflates in one-tenth second. After halting the vehicle's "tumbling" motion, it is reeled out by steel cable to the point of maximum drag. At lower altitudes, a parachute is ejected to complete recovery.

Fabrics used in these balloons must withstand the severest strain. And a Wellington Sears synthetic fiber fabric, with a protective coating on the surface, has been successfully used to slow down 500-lb. experimental capsules traveling twice the speed of sound at 150,000 feet!

Engineering industrial textiles for specialized technological needs is a century-old tradition with Wellington Sears. We've worked with development engineers in almost every field. And all this experience is yours to draw on. Write for assistance—and our illustrated booklet, "Fabrics Plus," Dept. G-7.

WELLINGTON SEARS

WEST POINT ® TEXTILES

FIRST in Fabrics for Industry

For mechanical goods, coated materials, tires, footwear and other rubber products

Wellington Sears Company, 111 West 40th Street, New York 18, N.Y. • Akron • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco

West Coast News

► A black polyurethane elastomer, Urapol 821A, said to have an unusually long pot life at room temperature, has been developed by Poly Resins, Sun Valley, Calif. The long pot life, 15 minutes at 77° F., is due to a new inhibiting principle which controls the reaction between the polyol and the prepolymer, allowing plenty of time to place the blended mixture. Urapol 821A is a compounded polyol blend which is reacted with a prepolymer, Urapol 800B. When cured, the manufacturer states, Urapol 821A has high tensile strength, resilience, excellent resistance to abrasion, compression set, oils, solvents, ozone, oxidation and low temperatures, and excellent tear strength. The new material is expected to find applications in molded rubber goods, coatings, molds, encapsulating, potting, dip coating, prototype rubber products, and various other uses for particular industries.

► H. D. Wexelberg has retired as general sales manager at Gross Marketing Corp., Los Angeles, Calif., after 17 years with the firm and nearly 50 years in the automotive aftermarket. Mr. Wexelberg was instrumental in founding the Tire and Tube Repair Institute, an industry-wide organization of independent manufacturers of tire and tube repair materials. He will continue to remain active as a sales and marketing consultant.

► Frank M. Chapman has been appointed general manager of the Fluorocarbon Division of the Plastic and Rubber Products Co., Los Angeles, Calif. A graduate of the University of Vermont with a degree in chemistry, Mr. Chapman was formerly associated with DuPont, first in the technical sales service laboratory, and then as applications technologist, concerned with the development of the new Teflon applications and markets. Most recently, he was assigned development and marketing responsibilities in the Midwest.

The company has also announced plans for the installation of new specialized equipment for custom molding, with particular emphasis on volume production of seals for the automotive, valve, and chemical equipment markets.

► C. P. Hall Co. of California, Torrance, Calif., has completed construction of a $225,000 warehouse and office building. The 25,000 square foot building, located on a three-acre site in Torrance, is designed to provide faster service to the West Coast, and to assure greater stability of warehouse charges. The company states that the new building is one phase in a half-million dollar program of expansion at its Akron, Ohio, Newark, N. J., and Chicago, Ill., plants.

Firestone Names Carr

► Dr. Edward L. Carr has been named manager of research and development for the Firestone Synthetic Rubber & Latex Co., Akron, Ohio. He succeeds Dr. R. L. Bebb, who has been transferred to the chemical and physical research laboratory of the parent company. Dr. Carr received his B.A. degree in 1929 from Union University. He earned his Ph.D. degree in chemistry at Iowa State University in 1934, and from 1935 to 1938 studied at Yale University on a research fellowship. He joined Firestone in 1938 as a research chemist, and was named a group leader in synthetic rubber research in 1951.

General Tire Process

► General Tire & Rubber Co. will soon be awarded a patent by the U.S. Patent Office for an improved process for forming metal parts by using rubber in giant presses. Several years ago, the company's Central Development Division produced the first rubber forming pad, actuated by hydraulic pressure applied through a rubber diaphragm, which formed metal parts used mainly in the aircraft industry. Use of the new process is said to give added control and accuracy during forming, requiring little or no hand-finishing, and speeding production, since as many as 17 different parts can be formed at one time.

R. J. Reynolds

Appointed by Shell

► Dr. Richard J. Reynolds, research supervisor in the Emeryville research center of the Shell Development Co., Emeryville, Calif., has been appointed a technical assistant to Dr. Harold Gershinowitz, president of the company. He will also assist the firm's Licensing Division on chemical licensing problems. He will be located in New York for the two-year assignment. Dr. Reynolds attended the University of Utah, where he received his B.A. and Ph.D. degrees in organic chemistry in 1948 and 1951. He joined Shell Development six years ago as a chemist, and was appointed a research supervisor in 1958. Dr. Reynolds was a supervisor in the Elastomer Research Department at the time of his present appointment.

Bristol Breaks Ground

► Bristol Manufacturing Corp., Bristol, R. I., has begun construction of a 15,475 square foot addition to its plant. Occupancy of the concrete block and steel building is planned for October, 1961. This addition to its facilities will be used primarily to allow for expansion of manufacturing and packing operations, utilizing additional equipment and latest techniques.

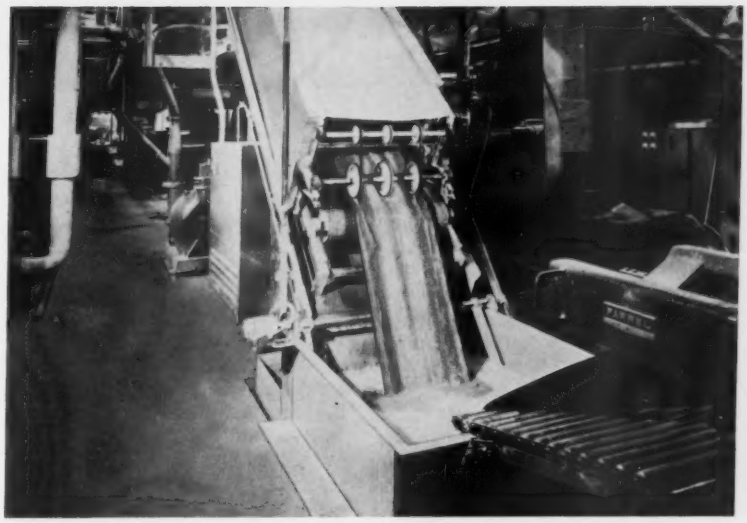
BDSA Appoints Higgins

► James H. Higgins, formerly a tire sales executive with the Seiberling Rubber Co., Akron, Ohio, has been named chief of the rubber branch, Chemical and Rubber Division, Business and Defense Services Administration, U. S. Department of Commerce. He succeeds S. Earle Overley, who has retired after 19 years of government service.

Hatfield Wire Opens Rubber Insulating Mill

►The Hatfield Wire & Cable Division of Continental Copper and Steel Industries, Inc., Linden, N. J., has begun operations at its new 240,000 square foot, $7,000,000 rubber mill and wire insulating plant, believed to be one of the most highly mechanized of its kind. Capable of producing more than 1,000,000 pounds of rubber compound in a five-day week and nearly 1,000 miles of finished wire and cable in a single day, the unit turns out finished products ranging from small, single-conductor building and communications wire to 15,000 volt utility power cables and huge lead-sheathed cables for underground transmission.

The plant is equipped to blend and manufacture automatically its own rubber compound (butyl, GRS, neoprene, or any other polymer); coat the bare multi-conductor wire, vulcanize the rubber and cool and reel the cable, in one continuous, automatic operation; and tape, braid, finish, and lead-cure the wire and cable, as required by its particular end use. Most operations are completely automatic, requiring only checking of the machines and the controls. The mill is one of the first units of a major wire and cable manufacturing complex being erected in Linden by Continental Copper. The complex is slated for completion by 1970.



While the conductors are being stranded, top-quality rubber insulation is mixed, compounded, and cut into continuous strips on special mixing and compounding units at the new rubber insulation mill operated by the Hatfield Wire & Cable Division of Continental Copper and Steel Industries, Inc., Linden, N. J.

Thiokol Sponsors Meeting

► Thiokol Chemical Corp., Trenton, N. J., was host to over 300 members of its Technical Club at a dinner meeting held on May 31 at the company's Trenton Chemical Division. Dr. William J. Clayton, vice-president in charge of research at International Latex Corp., Dover, Del., was guest speaker. In his talk on the subject "Selection of New Products," Dr. Clayton outlined the technical and market research necessary before a new product can be placed on the market. He emphasized that companies must understand the negative as well as positive attitudes of potential customers before presenting a new product to the general public. "New methods of motivation research," Dr. Clayton said, "help management to offer its new products in appealing packages, shapes, and colors, but the product won't sell if it isn't good."

Installs Testing Machine

► United States Rubber Co. has installed what it describes as the "world's largest conveyor belt tester" in its Passaic, N. J., plant. The machine is electronically-controlled, weighs 100 tons and measures 65 feet in length. It can test belts up to 140 feet long at speeds of 2,000 feet a minute. The belt-testing machine is capable of rapid accelerations and duplication of the type of surge loads encountered in the field. U. S. Rubber reports that the machine can test all types of belts, including "deep trough" belting, and can simulate a wide range of conditions to evaluate types of fabrics, cover and skim thickness, flex resistance, tension rating and rigidity, and mechanical and vulcanized belt splices.

Hughson Offers Chemfacts

► *Chemfacts from Hughson* is the title of the first in a series of newsletters available from Hughson Chemical Co., Erie, Penna., offering comprehensive background information and new product announcements in the areas of surface chemistry—adhesives, coatings, surface treatments, organic chemical specialties. The subject of this first newsletter is titled "Bondability as an Elastomer Criterion," extracted from an article which appeared in RUBBER AGE in September, 1960.

Seiberling Elects Officers

► Seiberling Rubber Co., Akron, Ohio re-elected its company officers at a recent meeting of the newly-organized board of directors. The officers are: J. P. Seiberling, chairman of the board and president; L. M. Seiberling, vice-chairman of the board and sales vice-president; H. P. Schrank, executive vice-president; R. J. Thomas, vice-president and treasurer; R. A. Hensal, vice-president in charge of production; R. L. Perkins, secretary and counsel; D. R. Kronenberger, comptroller; M. R. Rodman, assistant treasurer, and W. T. Johnson, assistant sales vice-president.

Cavicchioli Joins UCC

► The Silicones Division of Union Carbide Corp. has named Alfred G. Cavicchioli as a technical representative of the rubber service group at Tonawanda, N. Y. Mr. Cavicchioli was associated with Monsanto Chemical Co. from 1942 to 1943 as a laboratory assistant. He graduated from American International College in 1946 with a B.A. degree in chemistry, and received his M.S. in business administration there in 1960. Prior to joining Union Carbide in 1961, he was employed by the U. S. Rubber Co. at the Fisk tire plant, where he did research and supervised tire production.

Canadian News

► Polymer Corp. Ltd., Sarnia, Ontario, has begun construction of three new plants in Sarnia: a polybutadiene unit, a butadiene extraction plant, and a facility which will manufacture a new synthetic rubber. The polybutadiene plant will have a capacity of 20,000 tons a year. Although designed primarily for production of polybutadiene, the new facilities will be capable of producing other types of polymers, such as polyisoprene or synthesized natural rubber. Arrangements have been concluded with Goodrich-Gulf Chemicals and with Professor Karl Ziegler on the application of new and improved catalysts in the production of stereo-specific rubbers, including polybutadiene. Completion is set for late 1962.

The butadiene facilities, expected to cost over $1.5 million, will use the acetonitrile extractive distillation process of the Shell Development Co. This newly developed extractive method is said to make possible high purity of product. Polymer Corp. states that the new unit is needed to match more closely the increased output of its butylene dehydrogenation plant, recently achieved through process modifications, and to provide additional butadiene for the increased production of general purpose, butadiene - styrene rubbers. Completion of the project is scheduled for the fall of 1961. The synthetic rubber unit will produce a new rubber for heavy duty truck tires. Constructed at a cost between $8 million and $10 million, the plant is expected to go on stream by the end of 1962.

Polymer Corp. also announced that it is producing polybutadiene rubber from pilot plant operations and shipping small quantities to its customers for evaluation. According to reports, plans are ready for the construction of a commercial polybutadiene unit just as soon as scaling up of the pilot plant is finished and more complete market information is available. Such an initial commercial unit is expected to cost between $5 to $10 million.

Polymer's big decision has been which of the two most promising stereo-specific rubbers to make — polyisoprene or polybutadiene. But the company has virtually decided to produce the latter. However, polyisoprene has also been produced in laboratory lots and, according to Polymer, since there is a distinct similarity in the two processes, the new plant will be flexible enough to shift from one product to the other without too much modification.

The basic raw material for the stereo-specific rubber, butadiene, is already produced in substantial quantities in Sarnia, and the company states that additional quantities could be produced at the Sarnia plant of Imperial Oil Co., Ltd.

► The Ontario Research Foundation, Toronto, Ontario, has embarked on a long-range plan for expansion and growth, aiming its expanded research efforts chiefly at markets in the United States, as well as in Europe, Australia, Africa, and South America. This program consists of a physical expansion program, which contemplates the purchase of new equipment; enlargement of present facilities, and eventually the relocation of the Foundation in a new "research community" in the Toronto-Hamilton area; an expansion of its scope of research services to include a greater proportion of research contracts from United States and European companies, with a concomitant enlargement of research staff; a broadening of fields of scientific endeavor to include newer technologies and technical specializations; and to make available a more complete research service for clients. The Foundation believes that the broadening of its services and research efforts will help provide funds for the expansion program, while a greater volume of work will keep research equipment occupied more fully, enabling more rapid amortization of equipment.

► Multi-Chem Products Ltd., a recently-formed company located west of Ontario, will manufacture polyester resins and other basic materials for the reinforced plastics industry. The firm is a joint subsidiary of British American Paint Co., Victoria, B. C., and Chemical Oil and Resin Co., Toronto, Ontario. Multi-Chem will produce polyester under the trade name Polychem. Kenneth C. Blakely, formerly manager of Chemical Oil, is general manager of the new company.

► Speaking at the annual meeting of the Rubber Association of Canada, held on May 17 in Toronto, Ont., C. E. Joslin, president, reported that 1960 consumption of new rubber (natural and synthetic) declined some 10 per cent, from 101,000 long tons in 1959, to 91,000 long tons. Total industry sales fell about 2 per cent, from $394,000,000 in 1959, to $387,000,000 in 1960, while profits after taxes dropped 23 per cent, from $13,000,000 to $10,000,000. At the same time, Mr. Joslin continued, the industry continued to lose ground to import competition, with imports of rubber manufactures into Canada rising 3 per cent in value, from $42,210,000 to a new record of $43,500,000 in 1960.

The president pointed out that the decline in profits continued a trend which has brought industry profits down without interruption from 4.6 per cent of sales in 1956, to 2.6 per cent in 1960. He declared that the downward trend in profits and the upward trend in the importation of rubber goods must be halted, and he called for greater cooperation between labor, suppliers, transportation agencies, government and management in a drive to reduce costs.

During the meeting, an election of officers for 1961-1962 was held. C. E. Joslin, vice-president and general manager of the American Biltrite Rubber Co. (Canada) Ltd. was re-elected president. Other officers elected include: *Vice-president,* T. M. Mayberry (Firestone of Canada); *Treasurer,* W. H. Mason (Seiberling of Canada); *Manager and Secretary,* Greig B. Smith, Toronto.

► Mansfield Rubber (Canada) Ltd., Barrie, Ontario, reports that since it placed its 2-ply tire in production late in 1959, more than 186,000 2-ply tires built by the company have been running during the past 16 months without a single cord failure. The tires have all been in the lower price range, but the company states that testing in higher quality lines will result in 2-ply tires of premium quality "in the very near future."

► B. F. Goodrich Canada, Ltd. broke ground recently for the construction of a 250,000 square foot tire manufacturing plant in Kitchener, Ontario. According to the company the new facility, to be located on a 100-acre site in Kitchener's Industrial Park, will be the most modern tire factory in Canada.

TIRE FABRIC PROCESSING EQUIPMENT

SPLICE PRESSES

RUGGED, EFFICIENT & EASY TO OPERATE

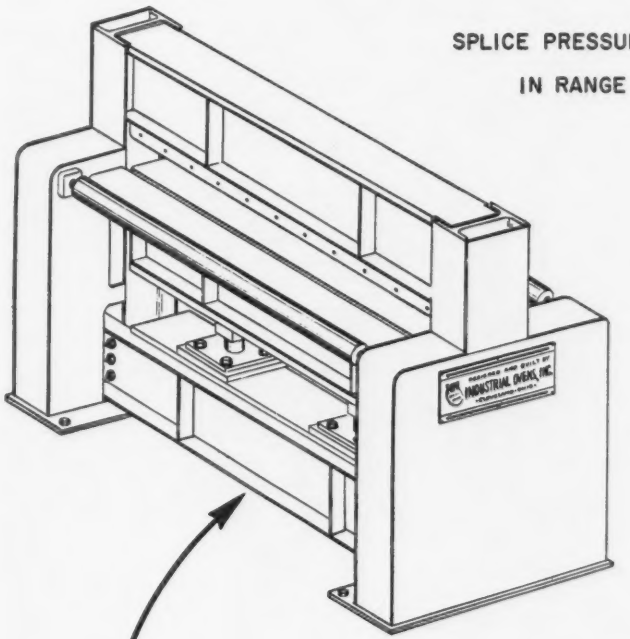
SPLICE PRESSURES TO SUIT REQUIREMENTS
IN RANGE OF 50 TO 300 TONS

MAXIMUM DEFLECTION ON PLATEN 0.020"

CLOSE TEMPERATURE TOLERANCES

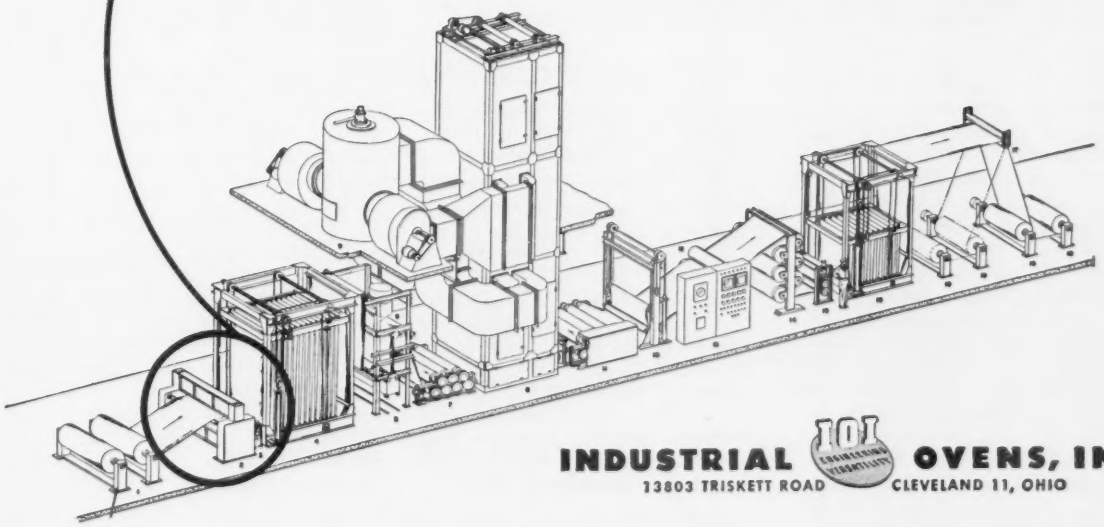
CLOSURE TIME 3 SECONDS MINIMUM

CAN BE SHIPPED COMPLETELY
ASSEMBLED READY FOR INSTALLATION



THE PERFORMANCE OF I.O.I. SPLICE PRESSES IN SERVICE WITH LEADING RUBBER MANUFACTURERS IS YOUR ASSURANCE OF QUALITY.

INQUIRIES INVITED



INDUSTRIAL OVENS, INC.
13803 TRISKETT ROAD CLEVELAND 11, OHIO

Obituaries

John Parks Coe

► John Parks Coe, retired vice-president of the United States Rubber Co., New York, N.Y., died suddenly on June 23 at his home in Connecticut. He was 71 years old. Mr. Coe attended the University of Kansas and graduated from Washburn College in 1911 with a B.A. degree. He then studied chemical engineering at the Massachusetts Institute of Technology, and in 1913 received a B.S.

degree. He joined U. S. Rubber that year at its tire and bicycle tube plant in Indianapolis, Ind., and the following year was assigned to the company's general laboratories in New York City.

During World War I he worked at U. S. Rubber plants on such projects as improved gas masks. He was then assigned to the company's Tire Division, and for a time was in charge of tire development. In 1931, Mr. Coe was transferred to the Naugatuck Chemical Division as factory manager of the division's main plant in Naugatuck, Conn. Five years later, he was appointed the division's general sales manager, and in 1939 was promoted to general manager of the division.

When the company formed a synthetic rubber division during World War II, he was also named to head this operation. He was elected a vice-president of U. S. Rubber in 1945. In 1953, Mr. Coe was named to handle the company's interests in the transfer of government-owned synthetic rubber plants to private industry. At this time, he was relieved of his duties as general manager of Naugatuck Chemical. In 1954, when U. S. Rubber joined with Texaco, Inc., to form a synthetic rubber company, Texas-U.S. Chemical Co., he was elected chairman of the board of the new company. He retired in 1955. Mr. Coe leaves a son and a daughter.

Carl F. Swartz

► Carl F. Swartz, District 1 director of the United Rubber Workers, died on June 5 at his home in Akron, Ohio. He was 60 years old. Following his graduation from high school, Mr. Swartz worked for the American Hard Rubber Co. He left the firm in 1925 to become a carpenter. Later he worked at the B. F. Goodrich Co. and the Firestone Tire & Rubber Co. before returning to American Hard Rubber in 1930. Three years later, he became active in the organization of a union at the company and became a charter member of Federal Labor Union Local 18395, affiliated with the AFL. In 1935, Mr. Swartz was elected president of URW Local 15 when it became the bargaining agent for employees of American Hard Rubber. He was appointed to the URW field staff in 1942, and seven years later became the union's District 1 director. District 1 is the largest in the URW and services about 50,000 rubber workers in seven states, including 35,000 in Akron. Mr. Swartz leaves his widow, two sons, and three daughters.

Armin G. Kessler

► Armin G. Kessler, retired vice-president and director of the Farrel-Birmingham Co., Inc., died suddenly on May 30. Mr. Kessler joined the Farrel organization in 1920 as general manager of the company's plant in Buffalo, N.Y., and was elected vice-president and member of the board of directors in 1923. He was, for a period, general works manager of all Farrel plants and, in 1945, was appointed manager of sales in the midwestern district, with headquarters at Akron, Ohio. Mr. Kessler's retirement from the company took place at the end of 1953, and in 1955 he also retired as director.

Henry E. Carroll

► Henry E. Carroll, manager of western hemisphere rubber plantations for Goodyear Tire & Rubber Co., Akron, Ohio, died of a heart attack in his office on April 7. He was 59 years old. Mr. Carroll joined Goodyear in 1919 as a tire bead builder. From 1929 to 1943, he was supervisor and foreman in several Akron plant departments. In 1943, Mr. Carroll entered time study work and then was assigned to Woonsocket, R. I., as a time study engineer. He was fabric personnel manager and later fabrics manager there before going overseas in 1945 to Java as manager of personnel and purchasing. He was plant manager at Java in 1952 when he entered the plantation field as personnel manager in Sumatra. Before returning to Akron earlier this year after 14 years of Far East Service, he was vice-president and managing director of Far East plantation operations. Mr. Carroll leaves his widow, a daughter, and two sons.

James B. Braden

► James B. Braden, supervisor of United Carbon Service Laboratory in Akron, Ohio, died on April 27 after a brief illness. He was 45 years old. Mr. Braden was a chemical engineering graduate of Ohio State University. In 1937, he became research chemist for the Goodyear Tire & Rubber Co. He left Goodyear in 1945 to become chief chemist for the Industrial Rubber Co., and in 1954 he joined the Dryden Rubber Division of the Sheller Mfg. Corp. as manager of its Montpelier, Ind., plant. He joined United Carbon in 1959 as assistant manager of its new technical service laboratory, and was promoted to manager earlier this year. Mr. Braden was a member of a number of professional chemistry societies, and was a regular contributor to RUBBER AGE. He leaves his widow, three sons, and a daughter.

Ruth Anna Jago

► Ruth Anna Jago, president of the Thwing-Albert Instrument Co., Philadelphia, Penna., died on May 28 following a brief illness. She was 61 years old. Miss Jago had been associated with the company in various capacities for 43 years. She was elected secretary of the firm in 1938 and became president in 1957.

Time out for admiration with TITANOX®

TITANOX titanium dioxide pigments add eye-catching beauty and sales appeal to a wide range of rubber and plastic products—including white and light-colored luggage that attracts admiring glances.

For many rubber and plastic products TITANOX-RA or TITANOX-RA-50 provide outstanding whiteness, brightness and opacity. Where weather resistance is of prime importance TITANOX-RA-NC may be preferred. Also new TITANOX-RA-40, rutile TiO_2, yields clean, bright whites and sharp tints at economically low loadings in many compositions. No matter which you choose, all TITANOX pigments have the ease of dispersion and uniformity that increase production efficiency.

For complete information on the type of pigment to meet your requirements, consult our Technical Service Department. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments, Ltd., Montreal. 7909

TITANIUM PIGMENT CORPORATION
SUBSIDIARY OF NATIONAL LEAD COMPANY

TITANOX

A new light source for testing fading and weathering of Rubber Products

ATLAS Xenon Arc

Weather-Ometer® and Fade-Ometer®

A high pressure Xenon Arc with a spectral radiation distribution very close to that of sunlight is now available in the Weather-Ometer and Fade-Ometer.

This new Xenon light source is a 6000 watt water cooled lamp which at a sample distance of 18⅞ inches produces a rate of deterioration equal to that of noon June sunlight.

Both machines have automatic control of black panel temperature, cycles, etc. and are available with automatic control of humidity.

The Xenon lamp is available with constant wattage transformers to insure a uniform radiation intensity regardless of variation in line voltage and controls are provided for increasing the wattage to compensate for loss of intensity due to lamp aging. Anticipated useful lamp life is 2000 hours. Lamp burner tube is easily replaceable by the operator.

Xenon Weather-Ometer®
$3457.00 up

A new testing machine for fast determination of the weathering qualities of rubber products. Fully automatic operation. Sample capacity 54 specimens 3" x 9" in size. Weather-Ometers manufactured after 1953 can be converted from carbon arc to Xenon arc.

Xenon Fade-Ometer® $3247.00 up. For testing color fastness or light aging of rubber products. Fully automatic. Sample capacity 140 specimens 2¾ x 4¾ or 70 specimens 2¾ x 8 inches.

Write for complete information

ATLAS ELECTRIC DEVICES CO.
4114 N. Ravenswood Ave., Chicago 13, Ill.

New Goods

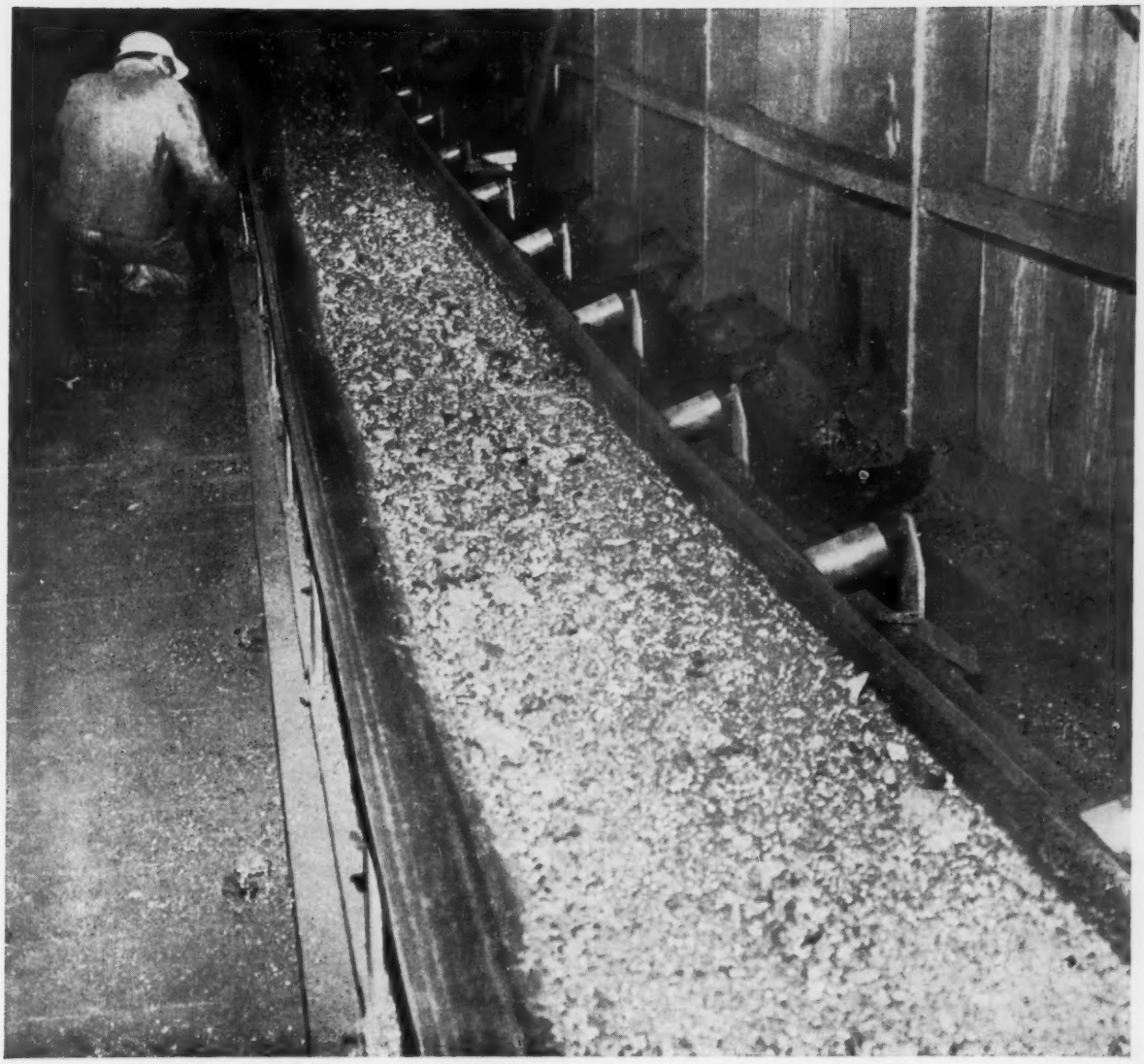
Goodyear Rubber Fenders

► Extruded rubber fenders, designed for installation on tug boats as replacements for rope and cut tire fabric fenders now used on many ships, have been developed by the Goodyear Tire & Rubber Co., Akron, Ohio. Approved by the

Navy Bureau of Ships for use on boats operating under its technical cognizance, the all-rubber units are said to offer long life and consistent response as their major advantages. The company states that tug boat operators can rely on a constant rate of cushioning and energy absorption, as well as consistent weight since, unlike rope and laminated fenders, rubber fenders shed water and the weight that goes with it. The resistance of rubber to rot is cited as an additional advantage.

Neoprene Suspension System

► A new concept of automotive suspension, featuring steel coil springs in combination with neoprene air-supported cushions for each wheel, has been developed by Renault, Inc., Billancourt/Seine, France. Patented by Renault as the "aerostable" system, the new suspension utilizes the coil steel springs for smooth riding. As the load or number of passengers increases, however, the neoprene synthetic rubber air cushions give additional support to the springs, preventing bottoming of the car and excessive sway in cornering. Renault engineers report that before neoprene was adopted for this use, it had to meet rigid specifications, including excellent aging properties, perfect air retention, resistance to oil and salt used on icy roads, high abrasion resistance, and good flexing properties.



BELT ACTION —The Milburn Colliery Company of Milburn, West Virginia produces a high grade bituminous coal that public utilities utilize for power purposes. In the Milburn #4 Mine approximately five thousand feet of conveyor belts are used to transport the coal underground and to the surface. These belts must of necessity be rugged, meet fireproof specifications, have great impact resistance, high resistance to abrasion and edge wear. They must also have a maximum fastener holding ability. This new P.V.C. impregnated and coated multiweave belt is an important new addition to the Milburn surfacing conveyors. This multiweave construction with either P.V.C. or Neoprene covers is gaining widespread acceptance and is becoming highly popular, particularly in coal mining operations. Belts were supplied to the Milburn Colliery Company by Hewitt-Robins, Inc. They were made with Mount Vernon's new multiweave belt carcasses.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

UNIFORMITY Makes The Big Difference

Mount Vernon Mills, inc.

A LEADER IN INDUSTRIAL TEXTILES

TURNER th HALSEY COMPANY

SELLING AGENTS

Main Office and Foreign Division: 40 Worth Street, New York, N. Y.

Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles

Copolymer RESEARCH HELPS YOU ACHIEVE GREATER PRODUCT QUALITY

AND THIS MAN KNOWS WHY!

He's DR. RAY L. SCHULTZ, Director of Research and Development at Copolymer . . . and he knows that customers look to Copolymer for leadership in providing them with superior products and more efficient technical services.

RAY and his staff couple creative thinking with the most modern equipment to investigate every possibility which may yield new products or result in additional customer benefits.

He's a Harvard man with a PhD and years of training and experience . . . part of Copolymer's program of dedicated exploration . . . helping customers to achieve greater product quality and uniformity, more economically!

Probing into the unkown in the search for new and better products requires the combination of well trained personnel and highly accurate equipment. Here, the electron microscope allows reliable evaluation of product performance characteristics through correlation of physical and chemical properties. Enlarged 20,000 times, this photomicrograph shows near-perfect dispersion, grinding and bonding of carbon black particles in a Copolymer HAF tread stock masterbatch.

Inquiring, imaginative minds along with precision instruments, like the vapor fractometer and the infrared spectrophotometer, are always at work benefiting customers . . . . developing new products and improving the quality of existing products to yield greater uniformity and consistency of performance.

Your Copolymer representative can help you select the right rubber for your manufacturing needs. Call him soon!

Copolymer RUBBER & CHEMICAL CORPORATION

Phone: Elgin 5-5655 P. O. Box 2591, Baton Rouge, Louisiana

CONTACT ONE OF THESE COURTEOUS, COMPETENT SALES REPRESENTATIVES, TODAY!

A. E. "Art" Bailey — Hartford, Connecticut CHapel 7-5731; Philadelphia, Pennsylvania LOcust 3-4663

West Coast Representative

R. E. "Bert" Dougherty — Los Angeles, California MAdison 4-9511; San Francisco, California YUkon 6-5493

M. D. "Ship" Morris — Akron, Ohio WAlbridge 8-3226

William L. "Bill" Ferguson — Akron, Ohio WAlbridge 8-3226

Grant Rickard — Atlanta, Georgia PLaza 3-7453

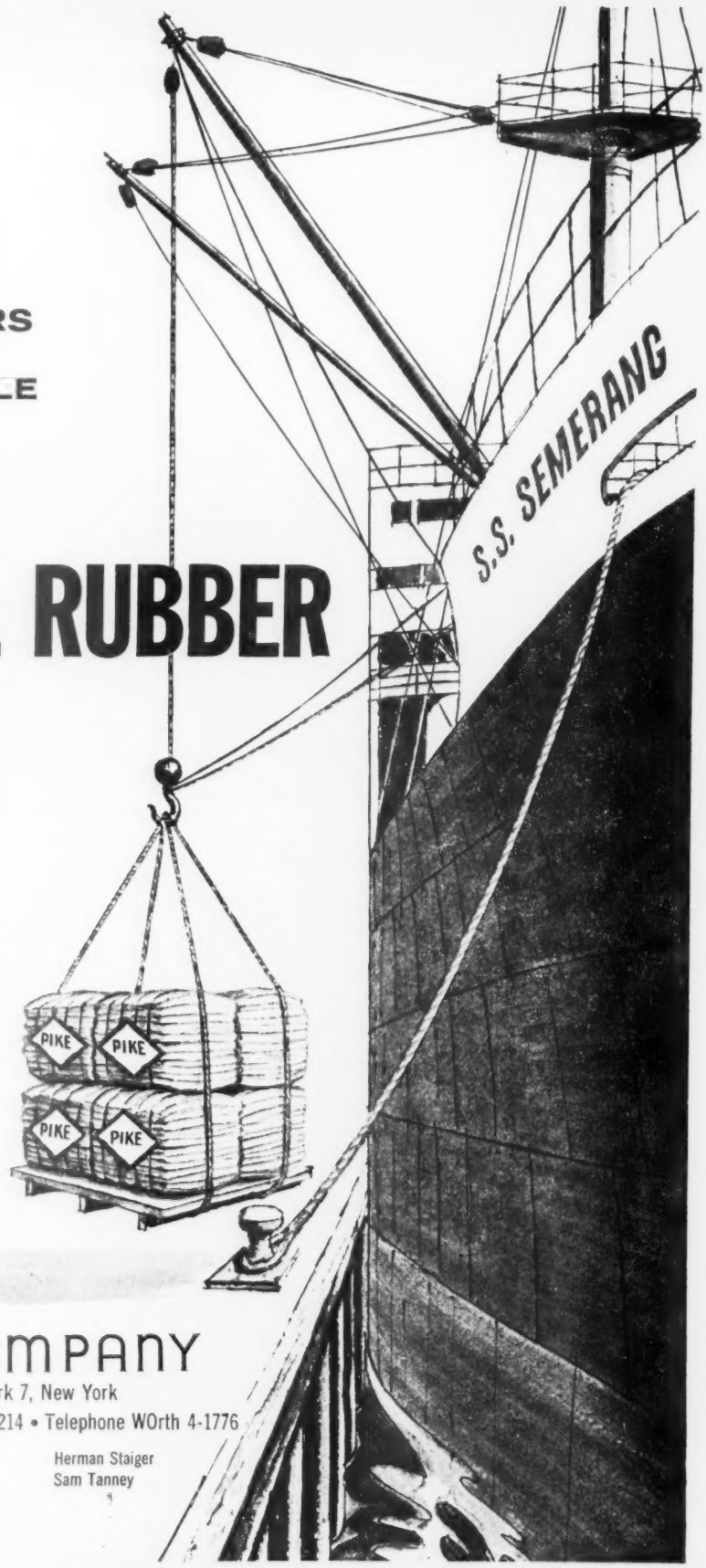
B. G. Hutchison — Chicago, Illinois SKyline 5-7095

FOR 40 YEARS

A DEPENDABLE

SOURCE OF

NATURAL RUBBER



Importing Natural Rubber is about 95% of our total business. We make direct purchases in many foreign lands, including Ceylon, Malaya, Sumatra, Java, Borneo, Cambodia, Vietnam, Burma, Bolivia, Brazil, Nigeria, Belgian Congo.

Forty years experience in importing Natural Rubber. Specialized grades for particular uses.

SJP

S. J. PIKE COMPANY

30 Church Street • New York 7, New York

Cable address "Pikesid, N. Y." • TWX NY 1-3214 • Telephone WOrth 4-1776

SALES DIVISION: Sidney J. Pike, George Steinbach, George Jatinen, Herman Staiger, Sam Tanney

Nab-A-Nap Auto Headrest

► An adjustable foam rubber cushion headrest reported to fit all makes and models of cars has been introduced by the Mark Manufacturing Co., 4230 Commercial S.E., Salem, Ore. Called Nab-

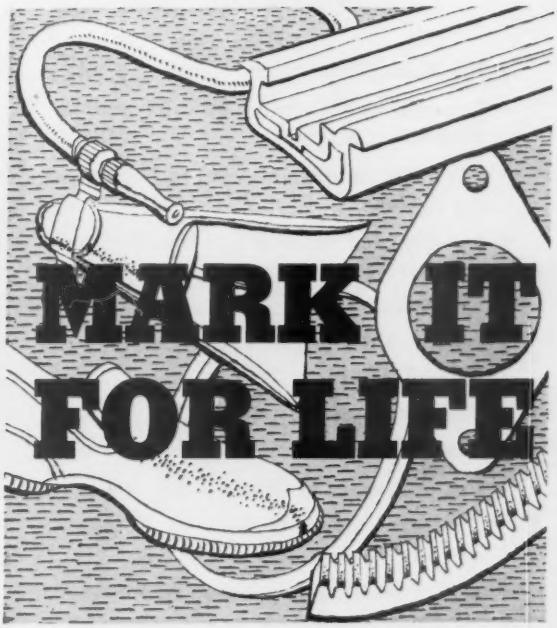
A-Nap, the headrest adjusts to any height or angle to provide driving comfort for driver or passenger, especially on long trips. The headrest is designed to relax neck muscles, and is also said to prevent "whip-lash" injury. Nab-A-Nap is also suitable for boats, davenport, or TV chair. It comes with a zippered corduroy cover which is removable for laundering.

Firestone Collapsible Dam

► A collapsible rubber dam, fabricated by the Firestone Tire & Rubber Co., Akron, Ohio, has been designed to control the flow of water used to generate power at manufacturing plants, and to aid in flood control. Called Fabridam, the installation controls the water level at intakes to condensers, where water is pressurized for the turbines which generate power. The Fabridam, a giant nylon bag, coated with neoprene synthetic rubber and inflated with 40,000 gallons of water, can be deflated to permit unobstructed runoff and increase the carrying capacity of the stream. When completely deflated, the dam lies flat on the bottom of the channel.

Fully inflated, the dam maintains the water at the required level. A dam currently in operation at the Westinghouse plant in Pittsburgh, Penna. is 95 feet long, weighs 6,300 pounds, and is stretched across the creek bottom and anchored with stainless steel bolts set into a concrete slab on the floor of the creek. Rubber and synthetic rubber are used for the dam, since they are flexible, collapsible, withstand abrasion, and can be reinforced with fabric (nylon) to give them strength against tearing.

cured
or
uncured



with a transfer

Mark rubber for life? Yes!

Through carefully controlled processing, Kaumagraph has developed two types of transfers for the rubber industry — one to be applied to uncured rubber, the other, for application to cured rubber.

You put your brand or identification on your product for the lifetime of your product. You do it easily in bright colors, completely legible, and at low cost.

Write for Free Samples and Details

KAUMAGRAPH COMPANY

wilmington 99, delaware olympia 4-2461

Offices: Boston, Chicago, Greensboro, Philadelphia, New York

ENGINEERING DESIGN with RUBBER

by

A. R. PAYNE and J. B. SCOTT

covering . . .

- The Rubberlike State
- Dynamic and Related Time-Dependent Properties of Rubber
- Other Properties Relevant to Engineering Design
- Dynamic and Related Test Methods and Machines
- Test Methods Other Than Dynamic
- Force-Deformation Relationships in Rubber Units
- Resonance and Transmissibility
- Some Practical Design Details
- Use of Rubber in Engineering
- Collaboration Between the Engineer and the Rubber Technologist
- British and U. S. Standard Test Methods for Rubber
- British and U. S. Standards for Natural and Synthetic Rubber Compounds
- Properties of Vulcanized Natural and Synthetic Rubbers

published in England

256 pp. **$8.00***

send orders to:

PALMERTON PUBLISHING CO.

101 West 31st Street

New York 1, N. Y.

*New York City addresses add 3% sales tax

Quabaug Shoe Soles

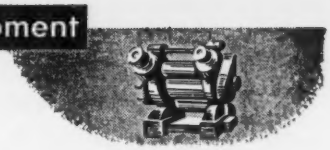
► Shoe soles and heels made of Hypalon synthetic rubber, introduced by the Quabaug Rubber Co., North Brookfield, Mass., are claimed to give a wear life three times that of conventional shoe bottoms. In addition, use of the Hypalon chlorosulfonated polyethylene soling material is said to offer the following advantages: ability to

be vulcanized; light weight and waterproof qualities; availability of lasting, non-marking colors; ability to be stitched or cemented with standard adhesives; resistance to deterioration by oils, greases, solvents and other harmful chemicals; soft walk and heel "snap", or resilience, of a true elastomer; and superior aging and resistance to oxygen and ozone. This combination of properties is expected to find broad applications in boys' and men's shoes, in quality work shoes, and in heels for men's dress shoes. The new products are being marketed as part of the company's Armortred line.

Aldan Protective Fabric

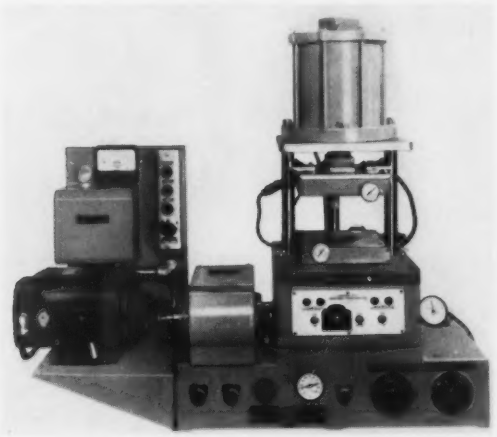
► A neoprene compound on polyester-base fabric has been developed by the Aldan Rubber Co., Salmon and Tioga Streets, Philadelphia, Penna., which is said to afford maximum protection for delicate electronic systems used in the Portable Scatter Communication Terminals, without any interference by the protective covering with the performance of the equipment. The fabric was designed to provide covering that will permit maximum protection, remain pliable in sub-zero temperatures and other severe weather conditions, and provide durability and portability.

► B. F. Goodrich Co., Akron, Ohio, is offering giant rubber bands up to 1½ inches wide and 6 feet long that can be stretched to 18 feet. They are designed to snap around the top layer of cartons stacked on pallets and prevent them from sliding and toppling to the floor when the pallets are moved.



Scott Mooney Viscometer

► A Mooney shearing disc viscometer with a new variable speed drive said to permit measurement of viscosity at different rates of shear has been developed by Scott Testers, Inc., 85 Blackstone Street, Providence, R.I. The drive on the unit, Model STI, provides shear rates from .05 to 20



rpm, and has a convenient tachometer to aid in rate setting. Other features of Model STI include temperature control within ±½°F. at any set temperature to 400°F. and above; fast, easy calibration; and minimum maintenance and downtime. According to the manufacturer the unit meets the requirements of ASTM D-1646 (formerly D-927 and D-1077), ISO, and other governmental and industry standards.

Rogers Urethane Foam Unit

► A urethane foam machine that dispenses foam systems having ratios of from three parts per hundred to 50:50 is being manufactured by Rogers Associates, Inc., Box 752, West Caldwell, N. J. Designated Model RA-2000, the unit has a capacity up to 3½ pounds per minute output and viscosities to 15,000 cps. The manufacturer suggests its use for such applications as: volume or specialty production of epoxy or urethane foam molded items; research or development to evaluate quickly and efficiently the characteristics of foam systems under machine conditions; technical sales personnel to demonstrate raw materials and foam system components; for contractors to perform on-the-job services; and for spraying. Model RA-2000 takes up 12x30 inches of floor space and weighs less than 100 pounds.

THE CARTER BELL MFG. CO. SINCE CARTER BELL PRODUCTS 1903 SPRINGFIELD, NEW JERSEY

Vulcanized

VEGETABLE OILS

rubber substitutes

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods — be they Synthetic, Natural, or Reclaimed.

A long established and proven product.

THE CARTER BELL MFG. CO.
SPRINGFIELD, NEW JERSEY

Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Chicago, Pico Rivera, (Cal.), Trenton, Denver
Albertville, (Ala.), Greenville, (S.C.)

Filling a long-felt gap in technical literature

RUBBER

fundamentals of its science and technology

Dr. JEAN LE BRAS

French Rubber Institute

translated by

IRENE F. BERCK, Ph.D.

Editor, Chemical Publishing Co., Inc.

460 pages • illustrated • 1957 • $12.00

This is the first book ever published which thoroughly covers the entire rubber industry, including synthetic elastomers, latices of both natural and synthetic rubbers, and even the pertinent plastics, in less than 500 pages.

It is written especially for the busy rubber chemist and technologist, beginner and student, who have no time to untangle the details they really need from a maze of compiled literature.

Utility is the keynote of the book. With judicious selection from the latest developments in rubber chemistry and physics, theories of elasticity, vulcanization, accelerators, reinforcement, antioxidants, etc., and the most up-to-date procedures of rubber technology and testing, it provides a well-balanced, concise but comprehensive treatise on this vital commodity.

Special attention is given to the principles of selecting the most suitable compounding ingredients to meet the specifications placed on the finished product.

Check These Features

- Up-to-date A to Z coverage
- Balanced theory and practice
- Instructive illustrations
- Comparative evaluation of natural and synthetic rubbers
- Simple and lucid style
- Time-saving index

RUBBER AGE
101 West 31st St., New York 1, N. Y.

Please send me .... copy(ies) of "Rubber—Fundamentals of its Science and Technology" at $12.00 each.

☐ Payment Enclosed ☐ Bill Me

Name .....

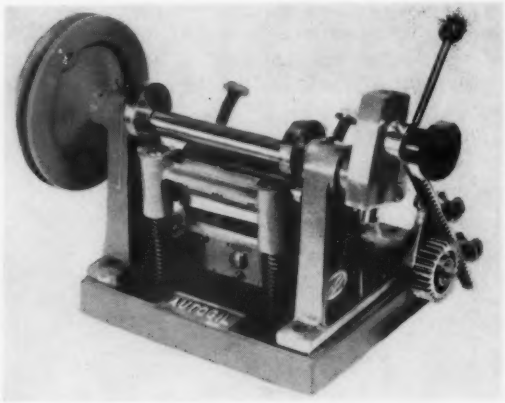
Address .....

.....

add 3% for New York City Addresses

Hobbs Autogil Cutter

► The Model 4 Type HS Autogil cutter is a new addition to the existing line of guillotines manufactured by the Hobbs Mfg. Co., 24 Salisbury Street, Worcester, Mass. The Autogil is designed for rapid production of any length pieces



of material up to web widths of 4 inches maximum. The unit will cut lengths ranging from 1/16-inch to 4 inches, and will make 300 cuts per minute. The cutter is equipped with solid steel feed rollers operated intermittently by means of a mechanical crank throw arm through a one-way mechanical clutch. It is said that the precision roller clutch assures a high degree of accuracy on all cut lengths.

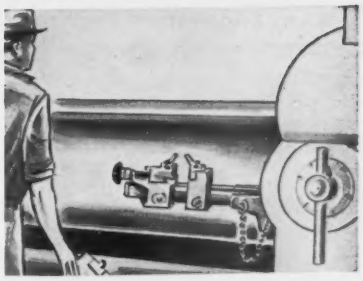
Brewster Rubber Mill

► The 6 x 12 inch rubber mill, manufactured by the Brewster Rubber Machinery Co., 349 Exchange Street, Akron 4, Ohio, is equipped with hardened steel rolls having rotary steam and water joints. The mill, called Type LG-14/s, is also equipped with both even speed and friction speed connecting gears. A clutch assembly is provided between the two sets of connecting gears, and selection of either friction or even speed is made by moving the selector lever to the left or right. Standard friction ratio is 1:1.25. The rubber mill is equipped with a 7½ hp motor, calibrated from zero to 30 inches. The exterior 220/440/3ph/60 cycles.

► A new pilot-size molecular still, called Rota-Film, is being manufactured by Arthur F. Smith, Inc., 311 Alexander Street, Rochester 4, N. Y. The still has three complete distillation units which are coupled in series and said to be capable of acting as preheaters, degassers and strippers, and recovery of low boiling components continuously, as well as distilling the major compound.

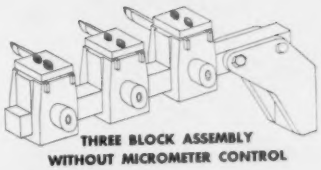
Accurate, Cleaner-Cut Strips...

with new fold-away GOODMAN MILL STRIP CUTTER



Don't be satisfied with hit-or-miss dimensions, rough, beveled edges, on your stock stripping. The GOODMAN MILL STRIP CUTTER is specially designed for precision requirements of stock feeding to another mill, extruder or lay up machine. A built-in micrometer knob assures exact width control, from 1" to 12". Models without micrometer and 3 blade assemblies for cutting two strips are available, too. Toolsteel blades are locked securely in place, and are easily sharpened. For *maximum safety*, unit swings up, holding blades against mill frame out of operator's way. Models available for mounting on right or left frames, for 24" to 84" two roll mills. *Write today for illustrated bulletin.*

Sales Representatives:
RALPH B. SYMONS ASSOCIATES, INC., 3571 Main Road, Tiverton, R. I.
WILLIAM A. SAFKA, 11 Sycamore Road, Levittown, Pa.
R. A. ROOSEVELT CO., 4909 E. Florence Ave., Bell, Calif.

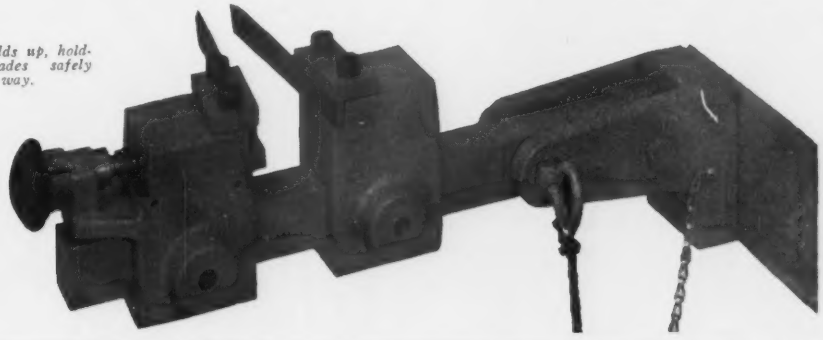


THREE BLOCK ASSEMBLY
WITHOUT MICROMETER CONTROL

G. F. GOODMAN & SON

401 Richmond Street, Philadelphia 25, Pa.

Unit folds up, holding blades safely out of way.



DPR®

DEPOLYMERIZED RUBBER

NATURAL CRUDE RUBBER IN LIQUID FORM—100% SOLIDS

AVAILABLE IN HIGH and LOW VISCOSITIES

DPR
INCORPORATED
A SUBSIDIARY OF
H. V. HARDMAN CO.
589 CORTLANDT ST.,
BELLEVILLE 9, N. J.

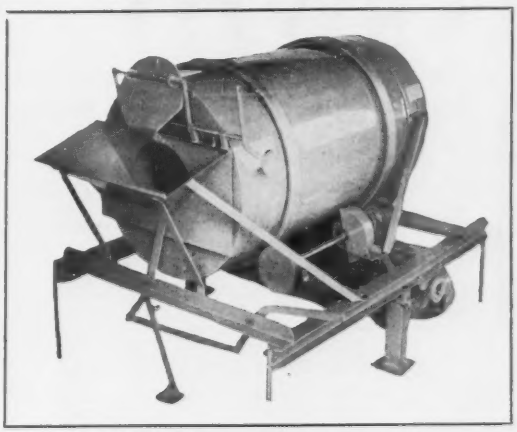
NOW! ROOM TEMPERATURE VULCANIZING for DPR (no sulphur)

DPR TRADE MARK

WILLS "SUB-ZERO"

ROTARY TUMBLERS

THE INDUSTRY STANDARD

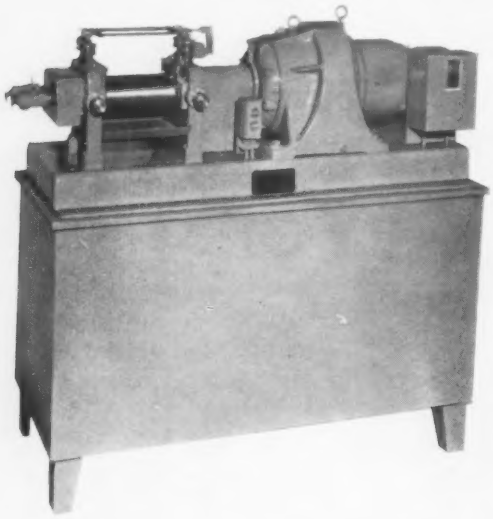


NOW — NEW IMPROVED SEAL
FOR EVEN GREATER DEFLASHING
ECONOMY WITH LIQUID CO_2

FERRY MACHINE COMPANY
WILLS RUBBER TRIMMING DIVISION
KENT, OHIO, U. S. A.
(Export Sales — Columbian Carbon International, N. Y.)

Reliable Laboratory Mill

► Reliable Rubber & Plastic Machinery Co., 2014 Union Turnpike, North Bergen, N. J., has developed a new 3x8-inch Junior laboratory mill for rubber and plastics. Features of the mill include: steel rolls for steam and water; full bronze bearings; cut tooth steel connecting gears; 1½hp gearhead motor with motor mounted brake; steel base; rotary joints; 1.25:1 friction ratio, or even speed steel connecting gears; mill pan; split guides; push button starter, safety switch and magnetic starter; and safety cradle. According to the manufacturer, all parts are standard and readily replaceable. Other features of the Junior mill are an interchangeable scraper knife, a set of chrome plated rolls, a separate steel stand, and knee safeties.



Tunco Grinding Wheels

► Tunco grinding wheels, manufactured by the Burgess-Norton Mfg. Co., Geneva, Ill., are tungsten carbide coated products designed for rubber buffing and grinding. According to the manufacturer, the wheels remove rubber faster and more precisely, generate practically no heat, avoid loading, and last up to 10 times longer than conventional wheels. The Tunco wheels are available in three abrasive grades—fine, medium, or coarse. They are 10 inches in diameter, have a 1-inch face width, a hub diameter of 3 inches with either a 1-inch bore or as required, and each wheel weighs approximately 10 pounds. Where needed for specific applications, wheels can be formed before coating to an infinite variety of shapes to produce uniformly finished parts.

WHO IN THE WORLD USES TREAD SKIVER KNIVES?

He can buy the good ones directly from the people who make them.

16" or 20" Diameters
5% Chromium Alloy Tool Steel (Stock)
Flame Plated (Linde Process—3 weeks)
Less than .006" Runout
Hardened 55 RC for best wear

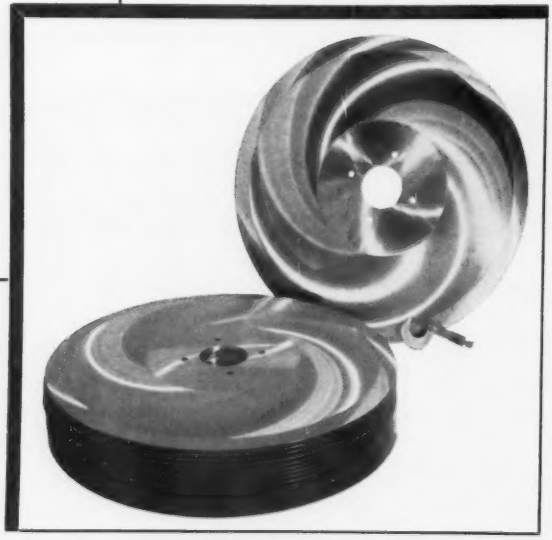
TRIAL OFFER

Buy one or two of any style. If you are not fully satisfied, send them back. The purchase price and shipping expense will be refunded.

SEND FOR EDGE TOOL CATALOG

LOOK AT THESE PRICES!

Quality	16" 798S Alloy	16" 798FP 1½" Plated	20" 799S Alloy	20" 799FP3 ¾" Plated	20" 799FP6 1½" Plated
1-3	$38	$90	$96	$115	$132
4-9	33	85	90	110	127
10 & Over	30	80	85	105	122



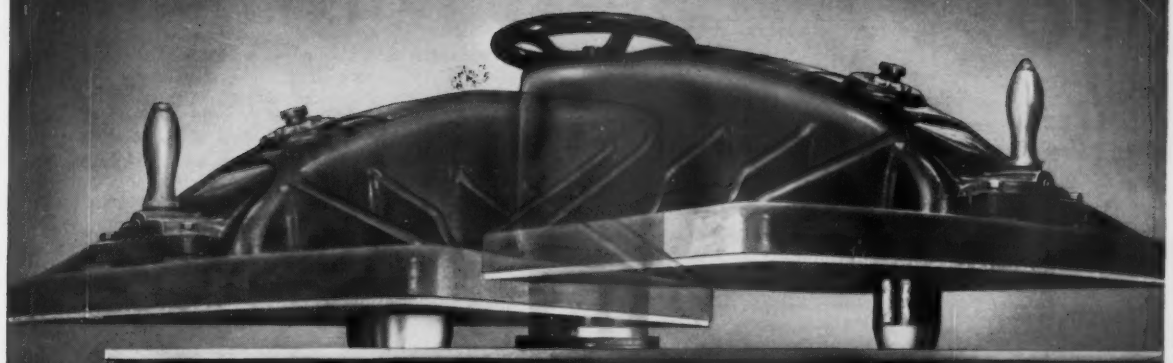
For these and all other high quality machine knives, up to 20" diameter, write

ALCON TOOL COMPANY

577 BAIRD STREET · AKRON 11, OHIO
Phone: PRinceton 3-5177, Area 216

Only Hytronic®

WITHOUT BEAM ADJUSTMENT



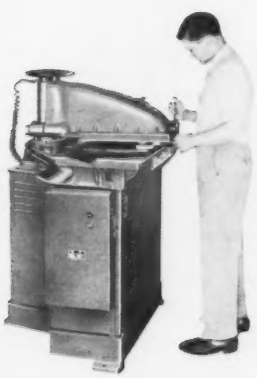
Cuts This Low . . . Cuts This High

For precise, controlled cutting of rubber goods, including seals, washers, gaskets, separators and insulators, only United Hytronic® Cutting Machines can use dies differing in height as much as 2⅜" without beam readjustment. Faster, more accurate cutting and increased production result.

Maximum die height, 5". Minimum, 5/16".

Users say of Hytronic, "if the beam clears the die, it cuts." Dies last longer. You save money on die sharpening and replacement costs. Only Hytronic electronically evaluates the cutting quality of each die; considers the resistance of the materials to be cut then automatically uses only enough power to make the cut.

For "prep" sized or finished cutting of seals, washers, gaskets, separators — whether rubber, plastic asbestos, cork, paper, fiberboard, aluminum or copper foil . . . almost anything, consider United Hytronic Cutting Machines.



AVAILABLE FOR SALE OR LEASE

United

UNITED SHOE MACHINERY CORPORATION

140 FEDERAL ST., BOSTON 7, MASS.

To Cut Costs, Cut with United HYTRONIC Cutting Machines

----------CLIP OUT AND MAIL----------

Dept. 1

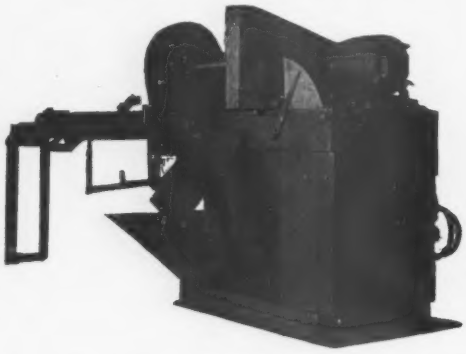
Yes, I am interested in cutting costs with HYTRONIC Cutting Machines. Please send brochure and Fact Sheets to:

NAME .....

FIRM .....

ADDRESS .....

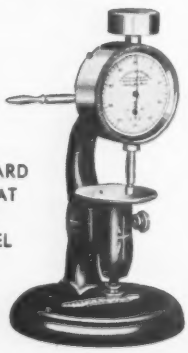
SLICER MACHINE
for
EXTRUDED STOCKS



Capacity Section up to 4" OD or 4x6" flat stock.
Length 3/16" to 8"
Cuts per minute 25 to 200
Automatic Feed and Circulating Pump.
Made in three sizes.

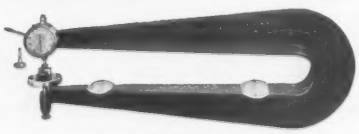
UTILITY MANUFACTURING COMPANY
Cudahy, Wisconsin
Write Today for Complete Information

RANDALL & STICKNEY
THICKNESS GAUGES FOR RUBBER



STANDARD THROAT 1¾" MODEL

THROAT DEPTHS
1¾" to 26"
FOOT TENSIONS
supplied by Internal Spring or Direct Weights
FOOT DIAMETERS
⅛" to 1¼"
ROLLS
Table and Roll or two Rolls
RANGE
½" or 1", also 1 CM Metric

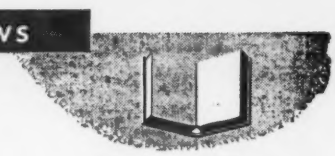


26" DEEP THROAT MODEL

SEND FOR CIRCULARS to Dept. A.

FRANK E. RANDALL CO., Inc.
248 Ash St., Waltham 54, Mass., U.S.A.

Reviews



Rubber and Railways in the Nineteenth Century: A Study of the Spencer Papers. By P. L. Payne. Published by Liverpool University Press, Bedford House, 123 Grove St., Liverpool 7, England. 5½ x 8¾ in. 246 pp. 30s. (approximately $4.50).

How closely the fortunes of transportation and the rubber industry are linked is revealed again in this study of the English firm of George Spencer & Co., whose founder was one of the first men to appreciate and utilize the properties of vulcanized rubber as a spring material. Trained as a draftsman, Spencer anticipated the opportunities for its use in the expanding railroads of the mid-Eighteen Hundreds. His designs for several types of springs to cushion the road shock between underframes and bodies of railway carriages were subsequently patented, and he formed his own firm. This book is based on the records of that company found in ten metal boxes under bales of rubber in the storage basement of one of its Wiltshire factory buildings in 1951.

In compiling this company history, the author was given complete freedom of investigation and publication of material uncovered. His research, which should be of interest to rubber industry economists and historians, also throws a good deal of light on pricing and marketing policies, sales strategy and tactics, and similar business activities of the period. In his advertising, for instance, Spencer was one of the first to make commercial use of photographs, supplying his agents and customers with pictures, drawings and specifications of new or improved apparatus.

The Spencer firm, competing at first primarily with manufacturers of steel springs, was basically a middleman-type operation. In the search for reliable sources of good quality rubber, however, George Spencer was led to the development of mechanical testing equipment. He invented a proving press as early as 1854 to determine the spring quality of rubber, and about 1880 devised another machine which measured permanent deformation by apparatus which simulated actual use of the springs on the railway cars.

In its original form, this piece of research was prepared as a doctoral dissertation. Although reworked for publication, it still retains characteristics of the original: many footnotes and heavy documentation. It contains a complete list of the patents owned and purchased by Spencer, lists of the railroads and rolling stock builders with whom he did business, and financial charts of various types.

•

Polymeric Materials. By Charles C. Winding and Gordon D. Hiatt. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. 6¼ x 9¼ in. 406 pp. $12.00.

Polymers are the primary materials in the plastics, rubber, protective coating and textile fiber industries. Although these four industries developed separately and even today have separate sales and technical service forces where single companies overlap them, the authors have seen a need for a text which is unified, and covers the common denominator of them all. Their working assumption is that "For an engineer or scientist, a broad general background in polymeric materials, not restricted by industries, is desirable regardless of specific employment."

In this context, then, they have provided an intro-

Ah! Here Is An Excellent Quartet Of Reasons To...

...Switch To Skellysolve!

Purity. No contaminated-solvent problems. We're sure, because we double-check Skellysolve—during production *and* before shipment. Of course, we also give you . . .

Fast Service. No late deliveries. When your order is received, it's phoned direct to the Skellysolve plant. What's more, nine out of ten cars of Skellysolve are shipped the day after the order is received. Naturally, we also offer you outstanding . . .

Technical Service. By experts, too. In fact, our technical service is backed by more than 30 years of Skelly experience. One more reason?

An Easy-To-Remember Telephone Number: LOgan 1-3575, Kansas City, Missouri. Nothing complicated about that. And by calling that simple number, you can solve your solvent problems! Just ask for Les Weber, and your solvent needs are in mighty good hands.

Skellysolve for Rubber and Related Industries

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor, in dried compound. Closed cup flash point about —25° F.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13° F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about —16° F.

SKELLYSOLVE-L. For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12° F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about —25° F.

Ask about our
Skelly Petroleum Insoluble Grease

SKELLY

Skellysolve

SKELLY OIL COMPANY

Marketing Headquarters
Kansas City 41, Missouri

Above: A typical Taylor-Stiles "GIANT" Dicing Cutter in use at the Baldwin Rubber Company, Pontiac, Michigan.

WHAT IS TAYLOR-STILES?

Taylor-Stiles & Company is an organization specializing in industrial cutting equipment for rubber, plastics and other industries. This equipment has been marketed throughout the world for approximately one hundred years under the registered trademark "GIANT". While most of the machines are constructed to basic designs and operating principles, each machine is built for a specific purpose and in accordance with the customer's specifications and requirements. "GIANT" Cutters and Shredders are essentially mechanical shears. The fly knives on the revolving cylinder or cutterhead shear on an angle against one or more fixed bed knives. The action is much the same as that of the blades of a pair of scissors engaging each other to give a shearing effect. The cutterhead is a heavy steel forging which "stores" or accumulates a considerable amount of force or momentum. When this tremendous momentum is put behind the shear cutting knives, with the single point of contact with the stock being cut, maximum cutting action is obtained with the least amount of horsepower required. You get low upkeep, long knife life, clean cutting and smooth, minimum-vibration operation. Taylor-Stiles has recently enlarged and improved its facilities and installed many new high production machines. This continuing plant modernization program enables us to give you the best possible service in designing, testing and building the famous "GIANT" Cutting Machines.
Write today for the latest bulletin on Rubber Cutting and your copy of "WHAT IS TAYLOR-STILES"?

TESTING ROOM

A wide variety of "GIANT" Cutters is available to run sample batches as a free service to prospects for cutting equipment. Appointments can be made to witness the test run if desired.

GIANT

TAYLOR, STILES & COMPANY

RIEGELSVILLE, NEW JERSEY, U.S.A.

INDUSTRIAL CUTTING EQUIPMENT FOR PLASTICS, RUBBER, TEXTILE, PAPER AND OTHER INDUSTRIES; MACHINERY FOR BALE OPENING.

☐ I would like more information on your free sample cutting services.
☐ I would like more information on your rubber cutters.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

ductory volume which concentrates on the chemical, physical and engineering aspects of polymers.

The success of the volume is accordingly dependent on the clarity and organization and scope and depth of the material selected. Fortunately, both authors have used substantial portions of the manuscript as lecture notes in introductory courses on polymeric materials for several years prior to publication date. They report that students have readily accepted the order of presentation of material which they have incorporated here. This involves an initial introduction to the chemistry of polymers, including molecular structure and properties. This is followed by applications and fabrication methods. The first part thus covers fundamentals that are common to many polymers; the second contains detailed discussions of specific commercial polymers.

By way of general comment, it should be mentioned that charts, tables and listings are exceedingly clear and straightforward. Typography is good.

A listing of the specific chapters follows: (1) Polymer Structure and Polymerization Reactions (2) Solutions and Molecular Weights of Polymers (3) General Properties of Plastics (4) and (5) General Applications of Polymeric Materials (6) Natural Products and Their Derivatives (7) Polymers Formed by Condensation Reactions (8) Ethenic Polymers (9) Silicones (10) Rubbers.

References, pertaining to works in the four specific fields, are included at the ends of each of the chapters.

BOOKLETS, CATALOGS, etc.

Polysulfide Crude Rubber. (Bulletin PS-1, October, 1960.) Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton, N. J. 8½ x 11 in. 8 pp.

This bulletin evaluates the resistance of polysulfide rubber compounds to halogenated hydrocarbons, as demonstrated in tests conducted by the company. In addition, it defines some of the factors which affect their resistance as a means of predicting the effect of untested halohydrocarbon fluids. A table showing the effect of halogenated hydrocarbons on the three types of polysulfide rubbers, ZR-300, FA, and ST, and a table showing the relative resistance of common elastomers to halohydrocarbons are presented.

•

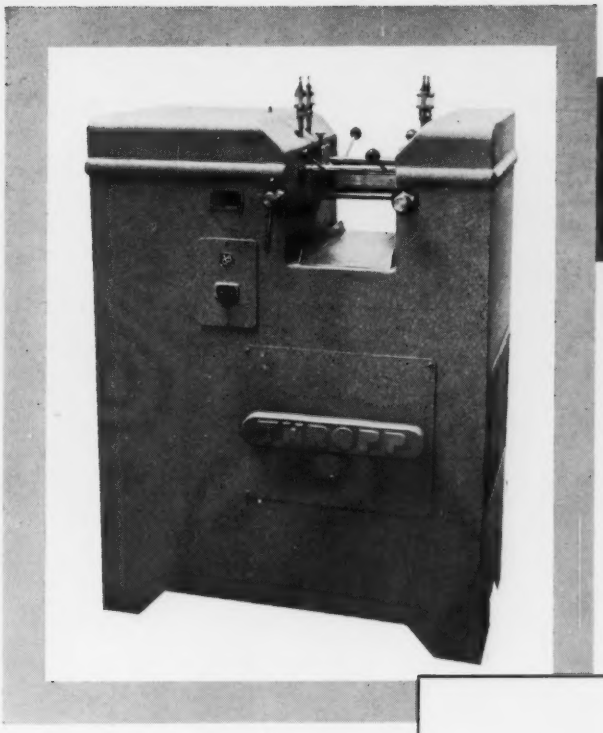
Industrial O-Rings. Stillman Rubber Co., 5811 Marilyn Ave., Culver City, Calif. 8½ x 11 in. 4 pp.

Laboratory data on four Stillman O-ring compounds especially developed for industrial application are included in this two-color booklet. The brochure illustrates some of the applications for these O-rings, and gives extensive details on quality control procedures. It also presents data on physical and chemical properties of the industrial O-ring, and price class information, along with photographs and brief descriptions of other products in the line.

•

Geigy Surfactants. Geigy Industrial Chemicals Division, Geigy Chemical Corp., P.O. Box 430, Yonkers, N. Y. 8½ x 11 in. 8 pp.

This bulletin presents information on physical properties and end uses of Geigy amines, alkanolamides, n-acyl sarcosines, and Nonisol surfactants. New products listed for the first time are nonylphenoxyacetic acid and lauroyl iminodiacetic acid, both carboxylic type surfactants with interesting corrosion inhibitor properties.



This NEW 3" x 8" THROPP MILL *expedites* rubber and plastics research

Aided by many years of experience in designing laboratory mills, Thropp engineers have developed this up-to-date 3" x 8" model. It sets new standards for attractive modern design, compactness and economical maintenance.

The new mill, designed for processing small batches, is one of the Thropp family of rubber and plastics mills, ranging in size up to 84". The machine has tilting type guides to facilitate thorough and rapid cleaning and prevent carry-over of color or other contamination to subsequent batches.

Manufacturers who appreciate the importance of fast, accurate, economical research and development work will find this machine a sound investment. Send for further information.

Wm. R. THROPP & Sons

Division of J. M. LEHMANN COMPANY, Inc., 555 NEW YORK AVE., LYNDHURST, N. J.

GUMMI—ASBEST—KUNSTSTOFFE

(Rubber-Asbestos-Plastics)

The international monthly journal of the rubber, asbestos and plastics industries.

Articles in German, English and French
Is regularly read in more than 60 countries
and is the Advertising Medium
for all firms interested in export.

Annual subscription DM 46.80 (incl. postage)

Specimen copy and advertising rates on application to the publishers.

A. W. Gentner-Verlag, Stuttgart / Germany
P. O. Box 668

EAGLE-PICHER

...an important source of lead and zinc compounds for the rubber industry

Eagle-Picher offers you a comprehensive line of both lead and zinc compounds, produced with highest quality control standards to your exact specifications.

Our customer service and research staffs are geared to answer your special needs . . . with courteous dispatch and resourcefulness.

Zinc Oxides	Litharge
Basic White Lead Silicate	Sublimed Litharge
Basic Carbonate of White Lead	Red Lead (95%-97%-98%)
Sublimed White Lead	Sublimed Blue Lead

Lead Peroxide

EAGLE EP PICHER

Since 1843

The Eagle-Picher Company
Department RA-761
Cincinnati 1, Ohio

MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

The price of natural rubber on the New York Commodity Exchange moved in a range of 150 points since our last report (June 1), high for the period being 30.75c reached on June 21, and low being 29.25c reached on June 29 and 30. The average price of spot rubber for the month of June was 30.04c based on 22 trading days. This compares with 32.04c in the previous month.

The General Services Administration is said to be proposing changes in the sale of stockpiled rubber sold on the open market. It is reported, however, that the State Department and the Office of Civil and Defense Mobilization are holding up the plans to prevent any upset in the market.

Merrill Lynch, Pierce, Fenner & Smith reports, meanwhile, that world markets have been in the doldrums over the uncertainties developed by potential GSA actions. Rumors of a downward adjustment of the sales price have now given way to expectations of disposal of deteriorating rubber.

40,000 Tons Involved?

As the weeks have gone by the figure thought to be involved has been raised steadily and now stands at a minimum of 40,000 tons. Since the rubber is said to be deteriorating, the sale, if approved, might not be made subject to the minimum sales prices, MLPFS believes. The only governing factor would be the ability of the market to absorb this rubber without disruption of the price structure.

Another factor has emerged which has had bearing upon the rubber picture. The strike of the maritime unions against the American merchant fleet has made some consumers wary about the availability of rubber over the near term. However, unless the longshoremen also strike, the flow of goods should not be disrupted to any great extent.

GSA reports that sales of stockpile rubber during May amounted to 2,153 long tons. To date, 109,409 long tons of the 470,000 long tons slated for sales have been disposed of. Of the English stockpile only 26,590 long tons remain available for sale.

IRSG Estimates

Estimates of the International Rubber Study Group indicate that natural rubber use in the world will once again exceed production. This would be the fifth consecutive year that this would happen. An estimated 2,000 long ton gap can be filled amply by sales of stockpile rubber. Also, the stock picture in Asia and the West is such that this small projected production deficit can be absorbed easily. Pan Malayan stocks of rubber at this point are said to be well ahead of stocks on hand at this time last year.

NEW YORK, JULY 5, 1961

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM JUNE 1 TO JUNE 30

June	Spot	July	Sept.	Nov.	Sales
1	30.50	30.50	30.00	29.80	69
2	30.25	29.90	29.60	29.40	62
3	....	....	....	....	..
4	....	....	....	....	..
5	30.00	29.95	29.60	29.43	28
6	30.13	30.00	29.80	29.55	26
7	30.50	30.45	29.90	29.65	22
8	30.25	30.25	29.65	29.50	16
9	30.50	30.40	29.60	29.50	3
10	....	....	....	....	..
11	....	....	....	....	..
12	30.00	29.95	29.17	29.10	30
13	30.13	30.00	29.20	29.15	35
14	29.63	29.60	28.85	28.75	74
15	29.75	29.75	29.10	29.07	21
16	30.00	29.75	29.15	29.05	15
17	....	....	....	....	..
18	....	....	....	....	..
19	30.25	30.00	29.15	29.10	7
20	30.50	30.50	29.35	29.20	18
21	30.75	30.79	29.50	29.25	38
22	30.50	30.10	29.00	28.85	4
23	30.00	29.90	29.00	28.65	24
24	....	....	....	....	..
25	....	....	....	....	..
26	29.75	29.85	28.80	28.60	15
27	29.50	29.62	28.50	28.25	54
28	29.50	29.65	28.75	28.60	25
29	29.25	29.45	28.75	28.55	97
30	29.25	29.30	28.75	28.60	20

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.29¼
Aug.	.29
Sept.	.28¾
Thin Latex Crepe:	
Spot	.31¼
Thin Brown Crepe, No. 2	.25⅞
Flat Bark Crepe	.20

London Market
(Standard Smoked Sheets)

Sept.	28.61 — 28.90
Oct.-Dec.	28.76 — 28.90

Singapore Market
(Standard Smoked Sheets)

Aug.	27.26 — 27.30

Middling Upland Quotations

	May 31	June 30		
	Close	High	Low	Close
July	33.27	33.25	33.25	33.25
Oct.	34.08	34.20	34.10	34.13
Dec.	34.52	34.75	34.60	34.61

Notes & Quotes

Factory production, which suffered the brunt of the recent recession, will increase to a level 15 per cent higher than that of the first quarter of 1961 as our economy continues its upturn through the next 12 months, A. J. Ashe, director of the business research for the B. F. Goodrich Co., predicted recently. "By the second quarter of 1962, factory output should be running at an even more rapid rate than our gross national product," he said. The GNP annual rate is expected to show a 10 per cent gain during this period.

Synthetic Rubber

On the basis of reports furnished by the Rubber Manufacturers Association, the ratio of synthetic rubber to total new rubber consumption rose to 72.03 per cent in May, an all-time high. Production of synthetic rubber in May rose to 109,470 long tons against April's 108,453.

The continuing rise in the synthetic ratio is, of course, of continuing significance. Through May of this year, the ratio was not influenced by any price changes. To put it another way, price changes did not contribute materially to the rising ratio.

Canadian Price Drop

Now, however, comes news from Canada which advises that the Polymer Corp. has dropped its domestic price for typical SBR from 23c to 22c a pound. Many in the trade are now asking if this does not anticipate similar price drops in the United States.

If domestic U.S. prices were to drop, would there be a major reflection in the synthetic rubber consumption ratio? And will these price moves add a new and significant dimension to the continuing battle between natural and synthetic?

Or will the price reductions, if any, be anticipatory of coming battles between conventional synthetic rubbers and the on-rushing stereo-regular polymers? There is much here to give pause to any analyst.

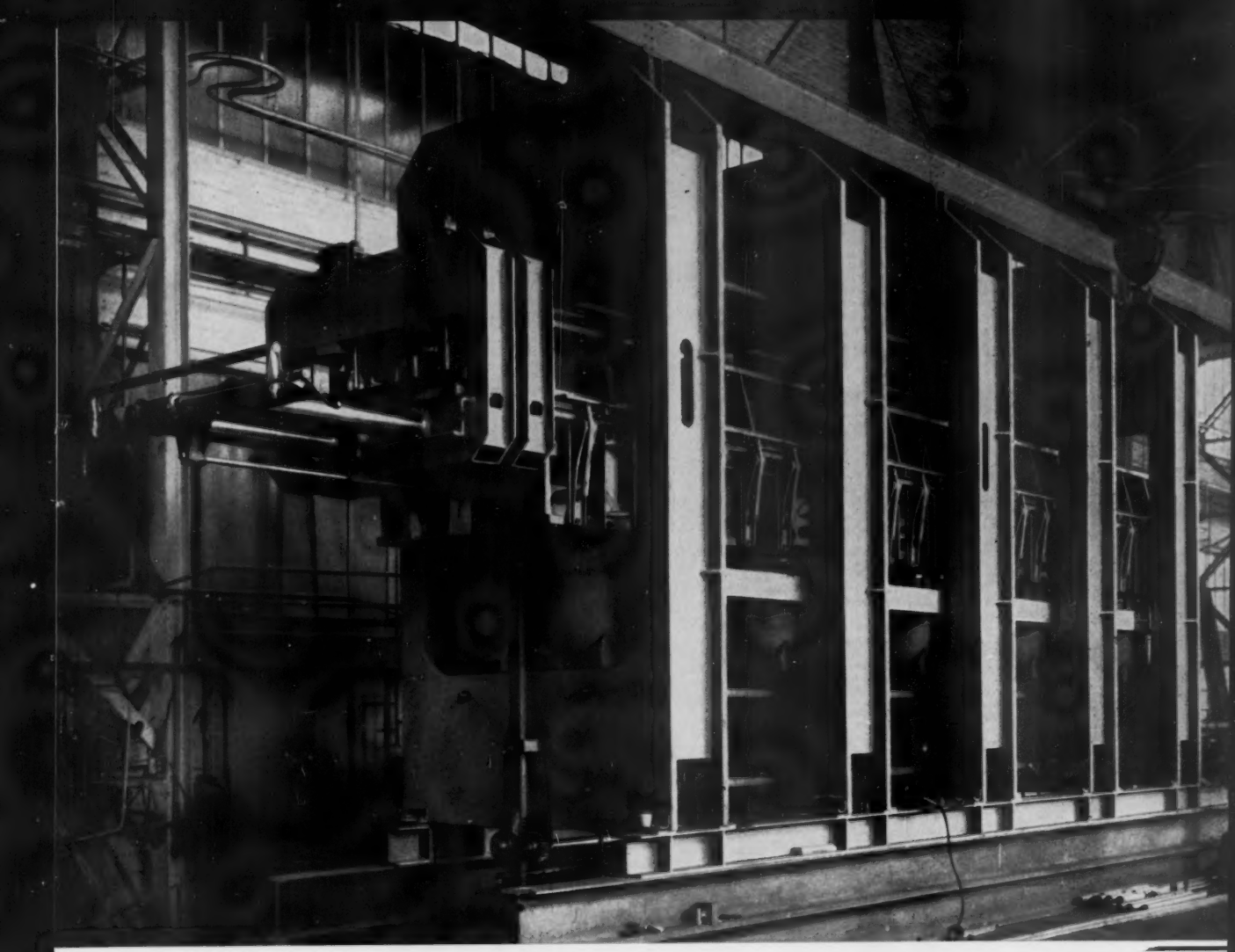
There are some who believe that the raw material battle of the future will be waged between SBR and the stereo rubbers. These people suggest that natural rubber will hold on to about 25 per cent of the market.

The capacity to produce stereo rubbers within the next few years will not be sufficient to make a really marked impact upon the market. Five or ten years from now the story will likely be a little different.

It should also be said that five or ten years from now the very essence of the natural rubber as well as the synthetic rubber industry will have changed materially. One should not presume to suggest what the market will be some years hence solely on conditions which exist today.

Extending the Status Quo

Imagine what might occur, for example, if in any given month very large quantities of natural rubber were made available from the stockpile at low prices. Presumably, there would be a noticeable realignment of the synthetic-natural ratio. Would this, however, be indicative of the true course of events? There will come a time when the stockpile situation will be different. We cannot, therefore, extend present conditions too far into the future.



Leading rubber plants all over the world operate our

Hydraulic Belt Presses

We supply belting presses with a working width up to 10 feet.

Siempelkamp

G. Siempelkamp & Co. · Maschinenfabrik · Krefeld

West Germany

Telegrams: Siempelkampco · Telex No.: 0853811 · Telephone: 2825

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B and N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.6300
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1509 and 1511	.2410
Ameripol 1000 and 1001	.2410
Ameripol 1605	.1900
Ameripol 1606	.1820
Ameripol 1608	.1845
Ameripol 1609	.2080
Ameripol 1610	.1870
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 1808	.1480
Ameripol 1809	.1545
Ameripol 1810	.1400
Ameripol 4600 and 4601	.2410
Ameripol 4604	.2410
Ameripol 4651	.1770
Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4664	.1845
Ameripol 4667	.2080
Ameripol 4700	.1750
Ameripol 4756	.1545
Ameripol 4758	.1450
Ameripol 4759	.1598
Ameripol 4760	.1576
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500 and 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
ASRC 3105 and 3106	.2410
ASRC 3110	.2600
B-123	.1820
Baytown B-129	.1900
Baytown B-134	.1900
B-142	.1515
Baytown B-172	.1825
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1606	.1820
Baytown 1608	.1845
Baytown 1609	.2080
Baytown 1801	.1760
Baytown 1803A	.1740
Baytown 1805A	.1550
Baytown 1808	.1480
Baytown 1809	.1545
Baytown 1811	.1569
Baytown 1813	.1640
Baytown 1815	.1496
Baytown 1816	.1580
Baytown 8600	.2410
Baytown 8676	.1876
Baytown 8679	.2022
Baytown 8681	.1835
Baytown 8682	.1890
Baytown 8700	.1885
Baytown 8775	.1545
Baytown 8776	.1679
Baytown 8781	.1655
Baytown 8782	.1583
Baytown 8783	.1515
Baytown 8784	.1598
CB-102 (Shell)	.2300
Carbomix 1606	.1820
Carbomix 1608	.1845
Carbomix 1609	.2080
Carbomix 1808	.1480
Carbomix 1809	.1545
Carbomix 1811	.1569
Carbomix 1813	.1640
Carbomix 1814	.1545
Carbomix 1815	.1496
Carbomix 1817	.1715
Carbomix 3761	.1576
Carbomix 3764	.1685
CB-102 (Shell)	.1850
Copo 1006	.2410
Copo 1500	.2410
Copo 1502	.2410
Copo 1505 NS	.2610
Copo 1507	.2410
Copo 1510	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
Copo 1778	.1910
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500 and 1502	.2410
FR-S 1703	.2060
FR-S 1710 and 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1015	.3500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.3050
Naugapol 1023	.3300
Naugapol 1503	.2625
Naugapol 1504	.3500
Naugapol 6003	.2700
Naugapol 6100	.3200
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1608	.1845
Philprene 1609	.2080
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Philprene 1808	.1480
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
Plioflex 1510	.2410
Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S-630	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2410
S-1002	.2435
S-1006	.2410
S-1009	.2475
S-1011	.2475
S-1013	.2410
S-1500	.2410
S-1502	.2410
S-1509	.2410
S-1703	.2060
S-1707	.1910
S-1709	.1885
S-1710	.1885
S-1712	.1885
S-1778	.1910
S-7501	.2410
S-7652	.1960
S-7702	.1750
SP-102	.3000
SP-103	.3000
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Enjay Butyl 10-65	.3000
Enjay Butyl 10-66	.3000
Enjay Butyl 10-67	.3000
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

SYNTHETIC RUBBER POLYMERS

Chlorosulfonated Polyethylene

Hypalon 20	.4700 [3]
Hypalon 30	.6000 [3]
Hypalon 40	.5000 [3]

Fluoroelastomers

Fluorel	$10.25 [2]
Kel-F 3700 and 5500	$16.00 [2]
Viton A and A-HV	$10.00 [2]
Viton B	$10.00 [2]

Isoprene Rubber

Shell 300 and 305	.2500 [2]
Shell 307	.2600 [2]
Shell 500	.2150 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [3]
Neoprene Type AD	.5500 [3]
Neoprene Type FB	.6500 [3]
Neoprene Type GN	.4100 [3]
Neoprene Type GN-A	.4100 [3]
Neoprene Type GRT	.4200 [3]
Neoprene Type KNR	.7500 [3]
Neoprene Type S	.4200 [3]
Neoprene Type W	.3900 [3]
Neoprene Type WB	.4100 [3]
Neoprene Type WHV	.3900 [3]
Neoprene Type WRT	.4500 [3]
Neoprene Type WX	.4100 [3]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000 [3]
Thiokol Type FA	.6900 [3]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	2.50 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400 and N-401	.5400 [1]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Tylac 640 and 650	.4500 [1]
Tylac 750	.4900 [1]
Tylac 850	.5300 [1]
Tylac 1640 and 1650	.5400 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2750 [3]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.3000 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [3]
FR-S 174	.2950 [3]
FR-S 176	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000 and 2001	.2750 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105 and 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174-F	.3200 [1]
Naugatex J-8855	.3000 [1]
Naugatex J-9049	.2750 [1]
Naugatex J-9064	.3050 [1]
Pliolite 2000 and 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105 and 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]
Tylac 400	.3000 [3]
Tylac 405, 430, 450-A	.2750 [1]
Tylac 410 and 420	.2900 [1]
Tylac 450-A	.2750 [3]
Tylac 3040 and 3340	.3200 [1]

Butyl

Butyl Latex 80-21	.3500 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

Suppliers are your Materials Listed in the Market Prices Section?
If not, forward full information to —
Market Editor **RUBBER AGE**
101 West 31st Street • New York 1, New York

COLORS FOR RUBBER-VINYLS
FINELY PULVERIZED, BRILLIANT
Midwest: FRED L. BROOKE CO.,
P. O. Box 463, Oak Park, Ill.
Pacific Coast: ERWIN GERHARD
465 California St., San Francisco 4, Calif.
PALMER SUPPLIES CO.
2281 Scranton Rd., Cleveland
800 Broadway, Cincinnati
211 E. Robinson Ave., Orlando, Fla.
BROOKLYN COLOR WORKS, INC.
MORGAN AND NORMAN AVENUES, BROOKLYN 22, N. Y.

MARKED... for positive identification
A PRINTER KEYED to ECONOMICAL OPERATION
for BETTER printing on
WIRE • HOSE • TUBING
and other EXTRUDED materials
GS-100 for standard wire
GS-100 HD for heavy wire (Heavy Duty)
GS-200 A Prints both sides at once
SEND FOR SAMPLES OF WIRE IMPRINTED WITH GS-100, GS-100 HD OR GS-200 A
PRICES ON REQUEST
DUNCAN M. GILLIES CO., INC.
66 CENTRAL STREET,
WEST BOYLSTON, MASSACHUSETTS
Telephone: West Boylston TEmple 5-4443 5-4444

MARKETS

(continued)

Reclaimed Rubber

A total of 109,062 long tons of reclaimed rubber were produced in the United States in the first five months of the current year, contrasted with the 134,451 long tons produced in the first five months of last year. Consumption too is lower in the first five months of 1961 than it was in the same period of 1960, 104,071 long tons against 126,038 long tons. At the present consumption rate, 240,000 long tons of reclaim should be consumed in 1961.

What will happen to reclaim in the balance of the year is contingent upon the general economy and how far we have come out of the recession. Activities in the automobile industry for the balance of the year will also be a large factor.

Prices for reclaimed rubber have remained steady and business during the past period has been reported as moderate. Current prices follow:

(Prices for All Areas Except West Coast)
(Average price, carload quantities, minimum freight allowed)

	per lb.
First Line Whole Tire	.11½
First Line Whole Tire Stainless	.12¼
Second Line Whole Tire	.11
Third Line Whole Tire	.10¾
Fourth Line Whole Tire	.10¼
Black Carcass	.15¾
Peelings	.11½
Butyl Tube	.16
Natural Rubber Black Tube	.17
Natural Rubber Red Tube	.21
Mechanical, Light Color, Low Gravity	.26
Mechanical, Light Color, Medium Gravity	.20

Scrap Rubber

The trade reports that the scrap rubber market was moderately active during the past period with prices generally unchanged. The Rubber Manufacturers Association reports that 102,149 long tons of scrap rubber were consumed in the first five months of the current year which, gauged against earlier sentiments, is not too bad a showing.

Mixed auto tubes are reported to be moving fairly well as are black passenger tubes. Butyl tubes have remained fairly steady during the period. Current prices for scrap rubber follow:

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.06
No. 1 peelings	ton	38.00
No. 2 peelings	ton	27.00
No. 3 peelings	ton	20.00
Buffings	ton	14.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.06¼

Tire Fabrics

Tire manufacturers' stock of filament yarn, cord and fabric at the end of 1960 amounted to 49,000,000 pounds, a figure considerably below the 62,600,000 pounds held at the close of 1959, according to the U. S. Census Bureau.

The stock of rayon filament yarn was 1,700,000 pounds lower over the 12 month period, and the nylon yarn holdings decreased slightly more than a million pounds. But the principal decline was in the holdings of tire cord and fabric, which were lower by 10,800,000 pounds. This total was composed of a 11,600,000 pound drop in rayon cord and fabric stocks, which was partially offset by a million pound nylon increase.

Meanwhile, a spokesman for American Viscose Corp., has speculated that the declines in the shipments of Tyrex tire yarn this year have been due to a drop in the number of cars produced and to the increasing proportion of compact cars.

The compact car tires use about 20 per cent less tire cord than standard size tires. He also predicted that Tyrex cord tires will again be the standard for 1962 models. This year 48 per cent of Falcon and Comet, and 100 per cent of Corvair compacts were equipped with two-ply rayon cord tires.

Nylon Facilities

Preparing for the 1962 market, U. S. Rubber has announced plans for expenditure of $1.5 million on the installation of new nylon tire fabric production facilities at its Winnsboro, S. C., plant. This expansion is the second major U. S. Rubber addition to nylon fabric producing facilities in recent years; a third expansion of manufacturing facilities will be required next year, according to company spokesmen, with details as yet unannounced.

The U. S. Rubber plans are being based on the increase in the use of nylon in tire construction shown in recent years, particularly in heavy duty tires. In 1960, 34 per cent of all passenger tires and 50 per cent of all truck and bus tires made by American tire manufacturers contained nylon fabric. In 1958, 30 per cent of passenger tires and 37 per cent of truck and bus tires contained nylon fabric.

(Prices f.o.b. Shipping Points)

Rayon Tire Cord

1100	lb.	.57
1650	lb.	.51
2200	lb.	.50

Nylon Tire Cord

840	lb.	.92
1680	lb.	.92

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: Less than 20,000 long tons of natural rubber latex were imported into the United States in the first five months of the current year. The Rubber Manufacturers Association advises that 19,186 long tons came into the U.S. in the first five months of 1961 against the 26,593 long tons which were imported in the first five months of the preceding year.

The RMA also reports that 17,281 long tons of natural rubber latex were consumed in the first five months of this year contrasted with the 23,249 long tons consumed in the first five months of the previous year. As of May 31, 1961, there were 8,255 long tons of natural rubber latex in stocks on hand.

Natural latex is now selling at a 35-36c per pound level at East Coast ports in car load lots. It may be that this lower price will tend to stimulate sales somewhat although if the past few months are any guide price is not the factor it once was in the market.

Synthetic: The synthetic latex market remains stable with prices unchanged. If one word had to be selected which would aptly characterize this segment of the industry that word would be "stable." Certainly this is an enviable position for any commodity. If the rubber industry in 1961 will not enjoy as good a year, as a whole, as in 1960, the synthetic latex segment will be seen to have suffered the least.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in the extremely narrow range of 35 points since our last report (June 1), high for the period being 34.60c reached on June 29 and 30, and low being 34.25c reached on June 1 and 2. The average price of middling uplands for the month of June was 34.44c based on 22 trading days. This compares with an average of 34.07c in the previous month.

Cotton prices established only very modest gains during the latter part of the period. The big news of the month was the rejection of the farm bill by the Senate Agriculture Committee and the apparent indication that no immediate farm legislation is to be considered for cotton.

The Commodity Credit Corporation reports that under the PIK (payment in kind) program for 1961-62, a total of 1,109,478 bales of cotton were exported. Under the 1960-61 program a total of 6,387,452 bales were exported.

Other news has come from Egypt, where the government has taken over all exporting firms and closed the futures market in Alexandria. This may have some impact on the world cotton market.

Soviet Rubber Technology

Annual Subscription Price . . . $50.
(Half-price to all teaching and non-profit institutions).

A cover-to-cover translation of the monthly Russian rubber journal, "Kauchuk i Rezina". Prepared by the Research Association of British Rubber Manufacturers, in collaboration with Maclaren and Sons, Ltd. Distributed exclusively by RUBBER AGE in the Western Hemisphere. Deals with the efficient use of raw material, the automation of manufacturing processes in the rubber industry and improvements to the design of tires and industrial rubber goods. Articles describing the most important chemical research of interest to the rubber industry are also included.

Although it has been obvious in recent years that Soviet rubber technology and research is very vigorous and highly advanced, it has been extremely difficult because of the language barrier for those in Western countries to follow the technical progress being made there. This, in spite of the fact that the Russian rubber journal is a prolific source of original literature on the subject.

Now, however, through the cooperation of the British Government and the Research Association of British Rubber Manufacturers, cover-to-cover translations of "Kauchuk i Rezina," the Russian rubber journal, are available on every single issue.

You may start your subscription with any issue, of course. Use the coupon to order.

Typical recent articles:

Production of latex foam articles.
Influence of composition on the biological degradation of rubber articles.
Properties of SKI-3—a new polyisoprene rubber.
Study of the abrasion resistance of rubber.
Inhibiting the polymerization of styrene.
Dynamic bond strength in plied-up systems.
Synthesis and properties of vinylsiloxane rubber.
Aging of rubbers in an oxygen-free medium.
Friction between rubber and hard substances.
Graft copolymers of styrene and rubbers.
Gelling of carboxylated latices.
Determining the high elastic properties of rubber at low temperatures.

DISTRIBUTED EXCLUSIVELY IN THE WESTERN HEMISPHERE BY RUBBER AGE

To: RUBBER AGE
101 West 31st Street, New York, N.Y.

Please enter my subscription for ..... copies of SOVIET RUBBER TECHNOLOGY, for one year (twelve issues) beginning with the ..... issue. I enclose $50. for each one year subscription. ($25 for schools or non-profit organizations)

Name .....

Company .....

City ..... Zone .... State .....

STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1958	474,409	484,492	20,085	76,491
1959	526,048	555,044	18,750	79,405
1960	410,640	479,598	12,409	77,525
1960:				
Jan.	34,795	46,354	1,373	76,156
Feb.	40,949	46,022	1,448	75,320
Mar.	38,580	47,205	1,522	81,599
Apr.	36,344	42,032	803	83,451
May	32,018	41,263	840	82,693
June	31,639	42,576	509	76,605
July	28,555	35,229	1,488	76,389
Aug.	39,596	37,258	912	82,385
Sept.	31,862	36,770	754	82,227
Oct.	24,594	26,312	1,150	76,116
Nov.	30,411	40,965	1,177	71,608
Dec.	39,084	31,891	593	77,525
1961:				
Jan.	33,750	35,149	650	80,238
Feb.	24,682	31,871	437	76,412
Mar.	29,946	34,908	360	72,360
Apr.	1,540	33,208	—	69,019

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1958	406,059	153,127,066	67,593	45,047,040	473,652
1959	498,749	304,594,223	79,205	60,939,662	577,954
1960	357,071	278,318,969	49,653	43,964,341	406,724
1960:					
Jan.	29,455	22,167,388	5,340	4,690,413	34,795
Feb.	35,137	27,281,957	5,812	5,411,873	40,949
Mar.	33,453	26,696,437	5,128	4,659,021	38,581
Apr.	31,408	25,659,607	4,940	4,690,140	36,348
May	26,637	21,962,099	5,830	4,853,091	32,467
June	28,304	23,661,317	3,335	3,152,266	31,639
July	25,072	21,637,414	3,483	3,335,694	28,555
Aug.	35,423	28,919,412	4,174	3,825,191	39,597
Sept.	24,848	23,321,841	2,541	2,259,381	27,389
Oct.	24,866	17,985,313	2,042	1,615,488	26,908
Nov.	26,955	17,654,645	3,456	2,786,602	30,411
Dec.	35,513	21,371,539	3,572	2,685,181	39,085
1961:					
Jan.	28,990	16,356,186	4,761	3,539,388	33,751
Feb.	22,047	11,670,555	4,719	3,677,336	26,766
Mar.	24,881	13,284,536	3,856	2,547,116	28,737

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958	663,644	614,561	100,196	103,613	26,268	446,718	1,955,000
1959	698,249	721,359	91,696	108,398	23,962	421,336	2,065,000
1960:							
May	56,839	48,985	4,521	10,632	2,498	36,525	160,000
June	58,301	48,774	7,652	10,850	600	33,823	160,000
July	63,146	46,018	6,689	10,802	600	27,745	155,000
Aug.	62,164	34,117	8,394	10,276	600	36,949	152,500
Sept.	61,786	53,050	6,502	10,055	600	40,507	172,500
Oct.	63,109	54,153	9,121	10,587	600	34,930	172,500
Nov.	56,883	35,676	6,880	13,981	600	35,980	150,000
Dec.	66,902	71,304	13,153	14,853	600	38,188	205,000
1961:							
Jan.	67,475	34,891	10,251	12,707	500	31,676	157,500

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958	1,364,404	238,439	83,904	905,000	638,353	3,230,000
1959	1,626,370	259,655	101,484	985,250	689,741	3,662,500
1960:						
May	133,256	23,340	7,051	82,000	61,853	307,500
June	138,425	26,328	8,196	96,750	67,801	337,500
July	114,642	18,991	6,393	83,000	66,974	290,000
Aug.	125,836	17,266	6,253	78,750	66,895	295,000
Sept.	124,100	28,272	7,940	95,750	61,438	317,500
Oct.	125,817	24,002	7,238	100,500	57,443	315,000
Nov.	122,144	23,083	8,190	97,500	61,583	312,500
Dec.	111,967	23,224	6,925	94,750	55,634	292,500
1961:						
Jan.	121,350	21,095	6,872	100,750	69,933	320,000

Source: International Rubber Study Group. * Estimated.

Rim Production

	1956	1957	1958	1959	1960
Passenger Car	27,109,610	27,301,567	20,665,688	25,412,177	29,288,767
Truck & Bus	6,315,428	5,468,223	3,887,910	5,019,261	4,874,401
Agricultural	1,416,938	1,368,127	1,218,240	1,386,866	827,945
Earth Mover	88,812	67,289	61,883	111,077	93,971
Total	34,930,788	34,205,206	25,833,721	31,929,381	35,091,084

	1960: Nov.	1960: Dec.	1961: Jan.	1961: Feb.	1961: Mar.	1961: Apr.
Passenger Car	2,447,595	2,236,677	1,990,465	1,348,679	1,675,883	1,519,253
Truck and Bus	258,821	224,577	280,801	323,271	372,768	231,855
Agriculture	36,397	48,306	82,548	95,898	98,789	95,820
Earth Mover	2,638	5,144	8,069	13,692	12,589	5,505
Total	2,745,451	2,514,704	2,361,883	1,781,540	2,160,029	1,852,433

Source: The Tire & Rim Association, Inc.

Manufacturers of CANARY LINERS

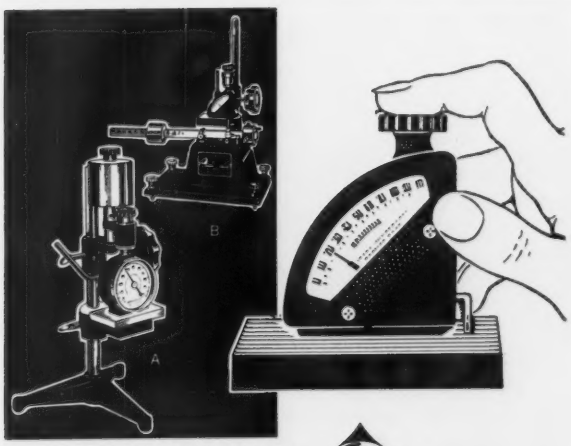
Mildew-proofing *and* Flame-proofing Cotton Fabrics as per Government Specifications. *Write or Wire for Samples and Quotations.*

WEST COAST REP.
R. D. Abbott Co., Inc.,
5268 Alhambra Ave.,
Los Angeles 32, California

EXPORT AGENT
Columbian Carbon, International, Inc.
380 Madison Ave., New York 17, N. Y.

CANADIAN AGENT
Columbian Carbon (Canada) Ltd.,
7 Superior Ave., Toronto, Ontario, Canada

J. J. WHITE Products Co.
7000 UNION AVENUE
CLEVELAND 5 OHIO



THE ORIGINAL Shore
DUROMETER

Since 1915 the international standard for testing the hardness of rubber and rubber-like materials including plastics, both elastomeric and semi-rigid.

FEATURES

- Available in both quadrant style and round style. Conform to ASTM D676, D1484 and D1706.
- May be used on Operating Stand "A" with or without DEAD WEIGHT to insure reproducible readings.
- The Durocalibrator "B" is for field use in calibrating and verifying the accuracy of Shore Durometers.

Shore **INSTRUMENT & MFG. CO., INC.**
90-35 VAN WYCK EXPRESSWAY
JAMAICA 35, NEW YORK

Now! **Replace Slow, Costly Hand-Skiving with the FIRST and ONLY practical PORTABLE SKIVER**

EASTMAN
MODEL SK
RUBBER SKIVING MACHINE

Tried . . . and proven . . . in actual factory use. Simultaneously cuts and skives slabs up to ½ inch thick, at a fixed angle of 35° off the horizontal. Works perfectly on cured or uncured rubber, synthetic rubber, and foam. Produces a uniformly smooth and accurate cut. Automatic knife sharpener renews blade-edge as the machine is cutting.

STRIP-CUTTERS STRAIGHT-KNIFE and regular **ROUND KNIFE** machines available

Send for Circular
Representatives Everywhere

Care to try this Eastman?

EASTMAN MACHINE COMPANY
Tel: Area Code 716, TL 6-2200 **BUFFALO 3, NEW YORK**

Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1957	**913,321**	**110,721**	**67,418**	**33,618**	**1,125,078**
1958	**872,565**	**97,806**	**54,113**	**32,431**	**1,056,915**
1959	**1,134,379**	**124,815**	**82,704**	**43,588**	**1,385,486**
1960	1,172,006	134,442	100,684	38,405	1,445,539
1960:					
Apr.	98,464	11,879	8,144	3,130	121,617
May	102,850	11,401	10,115	3,113	127,479
June	99,175	11,614	9,723	2,891	123,403
July	95,892	10,210	8,484	2,519	117,105
Aug.	99,213	10,120	9,999	3,247	122,579
Sept.	90,607	10,078	9,406	3,211	113,302
Oct.	88,451	11,219	8,906	3,226	111,802
Nov.	87,938	11,261	8,605	3,327	111,131
Dec.	86,628	11,291	4,232	3,194	105,345
1961:					
Jan.	85,025	11,896	6,316	3,272	106,509
Feb.	79,892	10,344	7,875	3,134	101,245
Mar.	90,418	10,073	9,783	3,289	113,563
Apr.	87,742	8,776	8,400	3,535	108,453

Consumption

1958	**730,196**	**69,694**	**53,432**	**26,590**	**880,912**
1959	**886,275**	**84,955**	**65,454**	**34,638**	**1,071,322**
1960	900,495	81,055	62,345	30,875	1,074,770
1960:					
Apr.	75,849	6,525	5,492	2,386	90,252
May	77,423	6,471	5,602	2,497	91,993
June	80,951	7,129	5,150	2,619	95,849
July	67,853	4,936	4,597	2,027	79,413
Aug.	73,761	7,200	4,880	2,737	88,578
Sept.	72,593	7,096	4,901	2,740	87,330
Oct.	74,606	6,920	4,552	2,706	88,784
Nov.	72,702	6,372	4,455	2,650	86,179
Dec.	67,549	5,983	4,229	2,315	80,076
1961:					
Jan.	71,653	6,345	5,143	2,591	85,732
Feb.	64,710	5,802	4,544	2,121	77,177
Mar.	71,110	6,592	5,005	2,559	85,266
Apr.	68,287	6,101	4,653	2,743	81,784

Exports

1958	**142,069**	**31,337**	**13,793**	**6,718**	**193,917**
1959	**211,300**	**39,551**	**21,700**	**8,256**	**280,843**
1960	257,027	47,580	29,649	7,699	341,955
1960:					
Mar.	27,081	4,874	1,803	532	34,290
Apr.	28,765	5,268	2,006	676	36,715
May	23,337	4,213	1,936	1,320	30,806
June	23,130	3,699	2,062	464	29,355
July	19,721	4,446	3,792	616	28,575
Aug.	22,753	3,519	3,494	501	30,267
Sept.	16,836	3,340	3,500	389	24,065
Oct.	15,439	3,913	2,922	629	22,903
Nov.	17,792	2,760	1,928	546	23,026
Dec.	17,415	2,775	2,282	759	23,231
1961:					
Jan.	18,180	5,047	2,273	545	26,045
Feb.	18,949	4,010	2,423	785	26,167
Mar.	19,415	4,471	2,933	649	27,468

Stocks

1957	**140,199**	**18,843**	**31,489**	**7,454**	**197,985**
1958	**143,533**	**15,688**	**18,770**	**7,292**	**185,283**
1959	**174,606**	**14,164**	**13,188**	**8,888**	**210,846**
1960	192,199	19,734	23,485	6,998	242,416
1960:					
Apr.	185,464	13,796	14,021	8,230	221,511
May	188,808	14,243	16,014	8,267	227,332
June	183,996	15,411	18,912	7,713	226,032
July	192,552	16,954	18,689	7,498	235,693
Aug.	198,695	16,072	20,877	7,096	242,740
Sept.	198,067	16,590	21,271	7,031	242,959
Oct.	192,090	16,405	23,205	6,891	238,591
Nov.	189,466	18,056	25,594	6,922	240,038
Dec.	192,199	19,734	23,485	6,998	242,416
1961:					
Jan.	186,626	19,865	23,035	6,721	236,247
Feb.	181,556	21,707	22,783	6,990	233,036
Mar.	180,355	21,941	26,212	7,119	235,627
Apr.	183,353	21,314	29,504	7,749	241,920

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1958	67,591	65,669	10,679	11,560	87,908	155,499
1959	72,502	93,303	13,127	14,034	120,464	192,966
1960	49,196	101,220	12,746	13,418	127,384	176,580
1960:						
Jan.	5,339	9,720	1,154	1,131	12,005	17,344
Feb.	5,812	9,862	1,085	1,098	12,045	17,857
Mar.	5,127	9,351	1,004	1,217	11,572	16,699
Apr.	4,935	9,408	1,137	917	11,462	16,397
May	5,380	8,162	1,250	1,009	10,421	15,801
June	3,335	7,541	965	973	9,479	12,814
July	3,483	6,481	953	983	8,417	11,900
Aug.	4,174	8,096	978	1,291	10,365	14,539
Sept.	2,541	9,397	1,119	1,299	11,815	14,356
Oct.	2,042	9,063	1,272	1,176	11,511	13,553
Nov.	3,456	7,205	1,169	1,328	9,702	13,158
Dec.	3,572	6,934	660	996	8,590	12,162
1961:						
Jan.	4,761	7,821	853	1,174	9,848	14,609
Feb.	3,506	6,286	817	966	8,669	11,575
Mar.	3,855	8,500	1,205	763	10,468	14,323
Apr.	....	7,703	1,167	1,008	9,878	9,878

Consumption[1]

1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	**75,009**	**68,305**	**9,039**	**8,630**	**85,974**	**160,983**
1958	70,183	60,283	9,555	10,549	80,387	150,570
1959	71,745	80,646	11,394	13,258	105,298	177,043
1960	50,898	87,457	11,221	12,079	110,757	161,655
1960:						
Jan.	5,491	8,094	999	1,117	10,210	15,701
Feb.	5,463	7,838	969	1,000	9,807	15,270
Mar.	4,847	8,104	1,076	927	10,107	14,954
Apr.	4,199	7,154	913	976	9,043	13,242
May	3,655	6,821	868	978	8,667	12,322
June	3,975	7,147	1,033	981	9,161	13,136
July	2,912	5,433	729	780	6,942	9,854
Aug.	3,897	7,857	1,057	1,078	9,992	13,889
Sept.	4,250	7,458	942	1,122	9,522	13,772
Oct.	4,283	7,371	971	1,118	9,460	13,743
Nov.	4,338	7,171	914	1,104	9,189	13,527
Dec.	3,588	6,756	750	898	8,404	11,992
1961:						
Jan.	3,525	6,667	779	1,005	8,451	11,976
Feb.	3,298	6,303	727	713	7,743	11,041
Mar.	3,575	6,866	936	904	8,706	12,281
Apr.	3,413	6,529	864	1,130	8,523	11,936

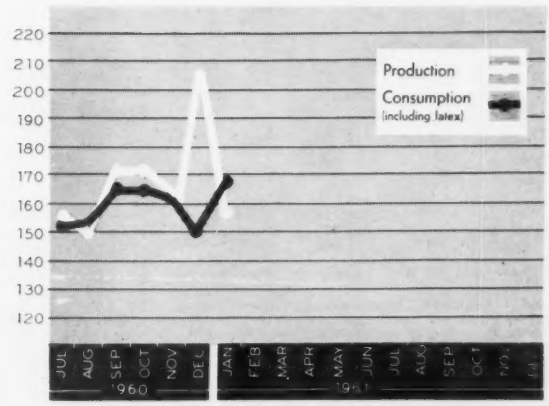
Stocks at End of Period

1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	**14,454**	**8,347**	**1,267**	**1,974**	**11,588**	**26,042**
1958	8,900	7,672	1,663	2,519	11,854	20,754
1959	12,717	8,226	1,581	2,883	12,690	25,067
1960	9,225	9,204	1,665	2,242	13,111	22,336
1960:						
Jan.	12,781	7,781	1,680	2,799	12,260	25,041
Feb.	12,974	8,606	1,534	2,535	12,675	25,649
Mar.	13,964	8,055	1,518	2,492	12,065	26,029
Apr.	13,896	9,081	1,595	2,242	12,918	26,814
May	15,214	10,031	1,745	2,342	14,118	29,332
June	14,140	9,142	1,530	1,941	12,613	26,753
July	14,785	9,364	1,564	2,064	12,992	27,777
Aug.	13,690	8,641	1,333	1,967	11,941	25,631
Sept.	12,852	9,172	1,494	2,034	12,700	25,552
Oct.	10,634	10,000	1,626	1,999	13,625	24,259
Nov.	9,284	9,180	1,798	2,300	13,278	22,562
Dec.	9,225	9,204	1,665	2,242	13,111	22,336
1961:						
Jan.	9,866	9,395	1,582	2,128	13,105	22,971
Feb.	10,280	8,801	1,508	2,247	12,556	22,836
Mar.	10,318	9,254	1,927	2,124	13,305	23,623
Apr.	9,404	8,643	2,058	2,271	12,972	22,376

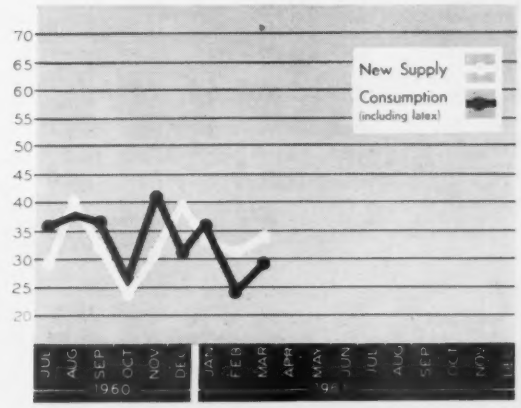
Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

STATISTICS at a glance

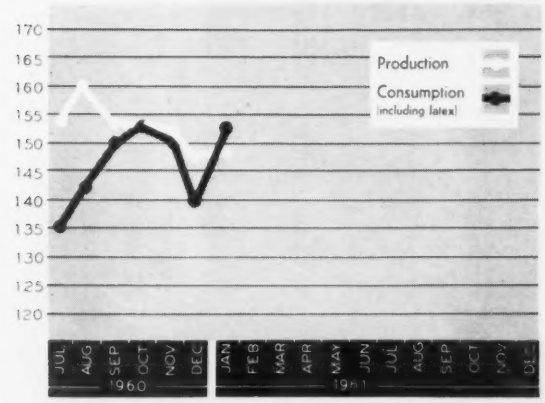
NATURAL RUBBER—WORLD
(thousands of long tons)



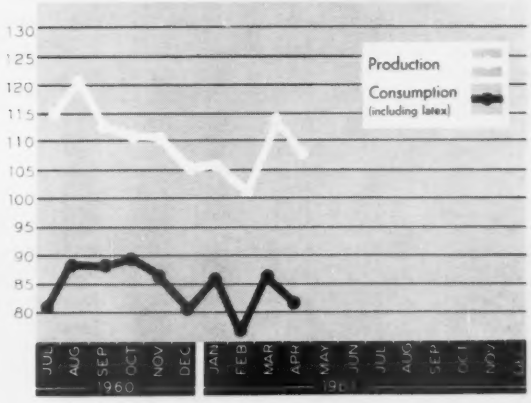
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



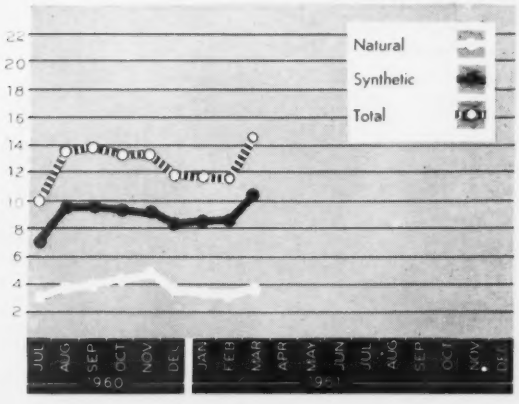
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



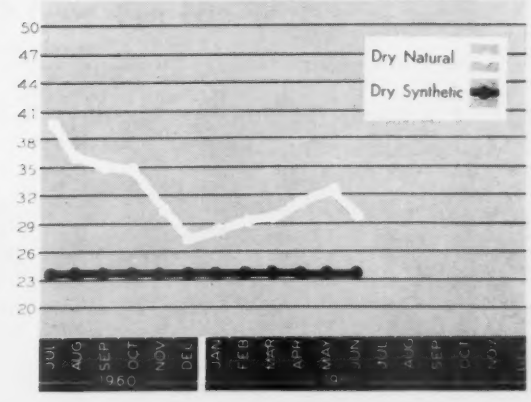
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1954 (total)	**33,333**	**55,155**	**1,753**	**90,241**	**89,141**	**14,762**
Passenger Car.	**29,741**	**47,044**	**928**	**77,713**	**76,794**	**12,217**
Truck and Bus	**3,591**	**8,111**	**826**	**12,528**	**12,347**	**2,545**
1955 (total)	**47,374**	**59,246**	**1,879**	**108,499**	**112,178**	**18,778**
Passenger Car.	**42,574**	**50,189**	**966**	**93,730**	**97,223**	**15,963**
Truck and Bus	**4,800**	**9,057**	**912**	**14,769**	**14,955**	**2,815**
1956 (total)	**35,422**	**62,146**	**1,757**	**99,325**	**100,406**	**79,872**
Passenger Car.	**30,873**	**53,252**	**875**	**85,000**	**85,546**	**16,494**
Truck and Bus	**4,548**	**8,894**	**883**	**14,325**	**14,859**	**3,378**
1957 (total)	**36,765**	**65,150**	**1,733**	**103,649**	**106,940**	**250,536**
Passenger Car.	**32,725**	**56,603**	**889**	**90,217**	**93,542**	**210,146**
Truck and Bus	**4,053**	**8,546**	**846**	**13,432**	**13,398**	**40,384**
1958 (total)	**26,783**	**70,797**	**1,348**	**98,928**	**96,563**	**20,939**
Passenger Car.	**23,408**	**61,570**	**717**	**85,696**	**83,636**	**17,778**
Truck and Bus	**3,375**	**9,226**	**631**	**13,232**	**12,927**	**3,161**
1959 (total)	**34,163**	**76,812**	**1,430**	**112,405**	**117,875**	**26,933**
Passenger Car.	**29,746**	**66,797**	**786**	**97,329**	**102,637**	**23,578**
Truck and Bus	**4,417**	**10,015**	**644**	**15,076**	**15,238**	**3,355**
1960 (total)	40,205	77,785	1,722	119,712	119,844	27,540
Passenger Car.	36,320	68,535	943	105,799	105,361	23,583
Truck and Bus	3,885	9,250	777	13,912	14,482	3,957
1960:						
May (total)	3,724	7,306	157	11,188	10,779	26,967
Passenger Car	3,361	6,542	78	9,981	9,458	22,985
Truck and Bus	363	764	80	1,207	1,321	3,982
June (total)	3,449	7,892	174	11,515	10,892	26,359
Passenger Car	3,098	7,105	94	10,297	9,559	22,271
Truck and Bus	352	787	80	1,218	1,332	4,088
July (total)	2,735	7,228	150	10,113	9,788	26,108
Passenger Car.	2,456	6,377	82	8,915	8,680	22,097
Truck and Bus	279	851	68	1,197	1,108	4,011
Aug. (total)	1,578	7,213	151	8,941	9,147	26,298
Passenger Car.	1,359	6,389	76	7,824	8,061	22,326
Truck and Bus	219	823	75	1,117	1,085	3,972
Sept. (total)	2,950	6,560	120	9,630	9,184	25,893
Passenger Car.	2,676	5,749	59	8,484	8,158	22,037
Truck and Bus	273	811	61	1,146	1,026	3,856
Oct. (total)	3,589	6,304	121	10,014	9,530	25,499
Passenger Car.	3,342	5,366	53	8,760	8,461	21,816
Truck and Bus	247	938	62	1,254	1,069	3,683
Nov. (total)	3,425	4,772	105	8,303	9,044	26,290
Passenger Car.	3,171	4,123	55	7,348	7,979	22,493
Truck and Bus	255	649	51	955	1,066	3,797
Dec. (total)	3,087	4,464	112	7,663	8,804	27,541
Passenger Car.	2,844	3,912	55	6,812	7,809	23,583
Truck and Bus	243	552	56	851	995	3,957
1961:						
Jan. (total)	2,449	6,590	91	9,130	9,221	27,682
Passenger Car.	2,191	5,955	44	8,189	8,234	23,691
Truck and Bus	258	635	48	941	988	3,991
Feb. (total)	2,191	4,720	92	7,002	8,589	29,338
Passenger Car.	1,930	4,150	43	6,123	7,641	25,268
Truck and Bus	261	569	49	879	948	4,070
Mar. (total)	2,448	6,595	123	9,166	9,212	29,385
Passenger Car.	2,134	5,876	72	8,082	8,196	25,385
Truck and Bus	313	719	52	1,084	1,016	4,000
Apr. (total)	2,934	7,202	96	10,232	8,882	28,033
Passenger Car.	2,602	6,444	54	9,100	7,866	24,150
Truck and Bus	332	758	43	1,133	1,017	3,883

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,525
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1948	3,909,270	1,363,856	5,132,090	1958	4,257,812	874,278	5,132,090
1949	5,108,841	1,123,736	6,232,577	1959	5,591,243	1,134,858	6,726,101
1950	6,665,836	1,332,263	7,998,099	1960	6,674,796	1,193,769	7,860,565
1960:							
Jan.	676,712	115,268	791,980	July	421,355	79,444	500,799
Feb.	656,579	125,938	782,517	Aug.	324,020	65,948	389,968
Mar.	659,730	131,169	780,899	Sept.	386,694	77,038	463,732
Apr.	588,046	114,590	702,636	Oct.	627,678	75,034	702,712
May	607,191	118,023	727,214	Nov.	600,495	86,957	687,452
June	605,582	111,420	717,002	Dec.	520,714	92,940	613,654
1961:							
Jan.	406,616	79,039	485,655	July	———	———	———
Feb.	363,193	84,821	448,014	Aug.	———	———	———
Mar.	425,892	99,909	525,801	Sept.	———	———	———
Apr.	453,425	93,858	547,283	Oct.	———	———	———
May	———	———	———	Nov.	———	———	———
June	———	———	———	Dec.	———	———	———

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1954	**25,071**	**35,576**	**945**	**61,593**	**48,279**	**9,519**
1955	**5,001**	**33,387**	**1,001**	**39,389**	**35,900**	**6,833**
1956	**3,100**	**32,358**	**1,040**	**36,498**	**34,405**	**6,109**
1957	**3,046**	**35,687**	**1,076**	**39,806**	**39,774**	**80,077**
1958	**2,678**	**37,872**	**870**	**41,420**	**41,266**	**8,602**
1959	**3,624**	**41,522**	**891**	**46,037**	**46,059**	**10,536**
1960	3,349	36,324	1,120	40,793	40,980	11,034
1960:						
Jan.	365	4,964	62	5,391	3,899	8,924
Feb.	370	3,554	87	4,011	4,043	9,002
Mar.	365	2,807	111	3,282	4,241	10,113
Apr.	330	2,862	114	3,306	3,628	10,495
May	307	2,932	91	3,330	3,611	10,852
June	295	3,154	98	3,547	3,444	10,700
July	242	3,103	94	3,440	3,261	10,627
Aug.	169	3,056	83	3,308	3,017	10,254
Sept.	232	2,563	100	2,894	3,024	10,446
Oct.	222	2,666	111	3,000	3,067	10,589
Nov.	229	2,354	74	2,657	2,921	10,859
Dec.	224	2,499	95	2,818	2,913	11,034
1961:						
Jan.	237	4,783	56	5,076	3,208	9,394
Feb.	231	2,987	58	3,276	3,140	9,246
Mar.	281	3,246	60	3,588	3,359	9,014
Apr.	299	2,533	70	2,902	2,939	9,096

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins: Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	All Other Vinyl Resins: Adhesives	All Other Uses	Grand Total
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1958	72,404	67,594	214,701	63,050	113,583	28,913	68,307	52,904	117,752	801,208
1959	85,136	125,639	304,711	64,703	151,840	31,371	94,418	57,599	159,528	1,074,945
1960	98,917	126,881	284,520	62,452	161,106	38,577	112,415	59,105	151,857	1,105,380
1960:										
Oct.	9,176	11,109	25,490	7,021	13,739	3,874	12,383	5,539	12,106	99,725
Nov.	7,351	10,830	25,459	5,571	15,723	3,922	9,510	4,884	13,378	96,861
Dec.	7,948	8,638	22,065	5,175	15,194	2,887	11,304	5,087	12,391	97,813
1961:										
Jan.	7,311	10,615	23,417	5,150	12,866	2,902	7,725	4,501	11,952	86,439
Feb.	7,145	8,878	20,299	4,385	12,603	2,124	8,444	5,064	10,936	79,878
Mar.	8,905	9,036	24,780	4,943	14,887	3,089	11,407	5,683	12,347	95,077
Apr.	7,438	10,135	23,059	5,237	15,575	2,943	11,134	5,187	12,666	93,374

Source: Chemical Division, U. S. Tariff Commission.

Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1960 Production Workers (thousands)	1960 Average Weekly Earnings	1960 Average Weekly Hours	1960 Average Hourly Earnings	1961 Production Workers (thousands)	1961 Average Weekly Earnings	1961 Average Weekly Hours	1961 Average Hourly Earnings
Jan.	208.0	$102.16	40.7	$2.51	187.5	98.81	38.9	2.54
Feb.	208.6	100.00	40.0	2.50	180.8	98.16	38.8	2.53
Mar.	207.5	97.71	39.4	2.48	179.2	....	...	...
Apr.	200.7	94.60	38.3	2.47	....	....	...	...
May	197.6	100.04	39.7	2.52	....	....	...	..
June	197.9	102.72	40.6	2.53	....	....	...	...
July	191.7	103.53	40.6	2.55	....	....	...	...
Aug.	196.1	100.15	39.9	2.51	....	....	...	...
Sept.	197.8	98.28	39.0	2.52	....	....	...	...
Oct.	197.9	101.49	39.8	2.55	....	....	...	...
Nov.	192.6	99.57	39.2	2.54	....	....	...	...
Dec.	190.6	99.58	38.9	2.56	....	....	...	...
Tires and Tubes								
Jan.	77.9	119.80	40.2	2.98	70.4	113.54	38.1	2.98
Feb.	77.4	117.71	39.5	2.98	67.2	111.67	37.6	2.97
Mar.	78.8	113.68	38.8	2.93	....	....	...	...
Apr.	78.1	107.38	36.9	2.91	....	....	...	...
May	77.0	117.51	39.7	2.96	....	....	...	...
June	76.6	121.39	40.6	2.99	....	....	...	...
July	75.9	123.71	41.1	3.01	....	....	...	...
Aug.	75.7	114.66	39.0	2.94	....	....	...	...
Sept.	74.5	112.40	38.1	2.95	....	....	...	...
Oct.	73.8	117.00	39.0	3.00	....	....	...	...
Nov.	73.1	114.60	38.2	3.00	....	....	...	...
Dec.	71.5	118.59	39.4	3.01	....	....	...	...
Rubber Footwear								
Jan.	19.0	79.40	39.5	2.01	18.3	82.32	39.2	2.10
Feb.	19.0	77.21	38.8	1.99	18.3	86.22	40.1	2.15
Mar.	18.9	78.61	39.5	1.99	....	....	...	...
Apr.	18.5	77.01	38.7	1.99	....	....	...	...
May	18.1	81.40	40.1	2.03	....	....	...	...
June	18.2	82.82	40.6	2.04	....	....	...	...
July	17.6	82.21	40.3	2.04	....	....	...	...
Aug.	18.2	81.40	40.1	2.03	....	....	...	...
Sept.	18.5	79.18	39.2	2.02	....	....	...	...
Oct.	18.5	82.59	39.9	2.07	....	....	...	...
Nov.	17.4	82.16	39.5	2.08	....	....	...	...
Dec.	18.4	79.00	37.8	2.09	....	....	...	...
All Other Rubber Products								
Jan.	111.1	93.52	41.2	2.27	98.8	91.01	39.4	2.31
Feb.	112.2	91.76	40.6	2.26	95.3	90.39	39.3	2.30
Mar.	109.8	89.78	39.9	2.25	....	....	...	...
Apr.	104.1	88.43	39.3	2.25	....	....	...	...
May	102.5	90.12	39.7	2.27	....	....	...	...
June	103.1	92.34	40.5	2.28	....	....	...	...
July	98.2	91.66	40.2	2.28	....	....	...	...
Aug.	102.2	92.75	40.5	2.29	....	....	...	...
Sept.	104.8	92.10	39.7	2.32	....	....	...	...
Oct.	105.6	93.73	40.4	2.32	....	....	...	...
Nov.	102.1	92.17	39.9	2.31	....	....	...	...
Dec.	100.7	89.40	38.7	2.31	....	....	...	...

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1954	1955	1956	1957	1958	1959	1960	1961
Jan.	34.16	35.07	35.24	34.82	36.31	35.67	33.09	32.25
Feb.	35.00	35.04	36.26	34.82	35.83	35.69	33.20	32.35
Mar.	35.23	34.33	36.70	35.35	36.05	35.71	33.54	33.27
Apr.	35.22	34.23	36.43	35.43	36.00	36.05	34.10	33.62
May	35.34	34.80	36.65	35.40	36.27	36.24	34.15	34.07
June	35.17	34.83	36.67	35.45	36.33	36.05	34.22	34.44
July	35.37	34.61	35.43	35.49	36.51	34.67	33.96	....
Aug.	35.19	34.53	34.31	35.15	36.36	33.17	32.59	....
Sept.	35.46	33.85	34.35	34.74	36.00	32.99	32.39	....
Oct.	35.24	33.93	34.45	35.09	36.23	32.77	32.21	....
Nov.	34.80	34.87	34.56	36.06	36.24	32.79	32.27	....
Dec.	35.03	34.95	34.56	36.50	35.75	33.02	31.60	....
Average for Year	35.10	34.59	35.50	35.36	36.16	34.57	33.10	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1957 = 100)

(Based on man-hours)

	1959	1960	1961		1959	1960	1961
Jan.	108	118	103	July	128	117	...
Feb.	113	117	102	Aug.	120	115	...
Mar.	112	115	96	Sept.	120	111	...
Apr.	104	115	...	Oct.	116	110	...
May	105	117	...	Nov.	120	109	...
June	117	122	...	Dec.	120	105	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1959	1960	1961		1959	1960	1961
Jan.	508	530	450	July	519	480	...
Feb.	490	570	460	Aug.	492	480	...
Mar.	506	510	490	Sept.	544	510	...
Apr.	543	530	490	Oct.	555	490	...
May	524	550	...	Nov.	482	500	...
June	520	520	...	Dec.	500	470	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1959	1960	1961		1959	1960	1961
Jan.	998	1,140	1,130	July	1,075	1,230	....
Feb.	1,022	1,140	1,130	Aug.	1,113	1,240	....
Mar.	1,030	1,160	1,120	Sept.	1,115	1,200	....
Apr.	1,015	1,190	1,150	Oct.	1,115	1,160	....
May	995	1,180	....	Nov.	1,120	1,140	....
June	1,013	1,200	....	Dec.	1,140	1,120	....

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22 40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28⅜	13¾	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅝	17¾	26.20	1945	22½	22½	22.50
1925	121	34¾	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24 21
1933	9⅞	2⅞	5.96	1954	34½	19½	23 61
1934	15⅞	8¾	12.92	1955	52	29⅜	39 16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅛	26⅜	31.13
1937	26⅞	14	19.39	1958	32⅝	24⅜	28.13
1938	17⅞	10¼	14.64	1959	49	29¾	36.56
1939	24	14⅛	17.57	1960	47½	28⅜	38.09

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 60c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1954	1955	1956	1957	1958	1959	1960	1961
Jan.	20.22	33.92	41.70	33.32	27.15	30.34	41.18	28.77
Feb.	19.98	34.90	33.68	30.43	26.32	30.26	39.33	29.00
Mar.	20.16	31.08	33.68	31.76	26.65	31.62	40.74	30.22
Apr.	22.06	31.75	31.75	32.23	26.44	33.72	40.35	31.21
May	21.96	31.35	29.61	32.12	25.51	36.48	43.62	32.04
June	23.01	34.74	30.54	32.80	26.20	34.31	45.70	30.04
July	24.12	40.84	33.91	32.88	27.70	35.19	40.90	....
Aug.	23.00	48.85	35.69	32.13	28.72	38.43	36.69	....
Sept.	23.00	48.27	32.64	29.94	29.49	40.22	35.04	....
Oct.	26.57	43.81	32.68	29.24	31.06	41.50	34.06	....
Nov.	28.07	44.95	35.18	27.47	32.10	45.16	30.63	....
Dec.	29.88	48.40	37.01	29.25	30.28	41.46	28.81	....
Average for Year	23.61	39.16	34.24	31.13	28.13	36.56	38.09	....

Various Compounding Materials Consumed by the Rubber Industry

Material	1953	1954	1955	1956	1957	1958	1959
Antimony, Primary							
Short tons	20c	49c	78	156	284	265	217
% of total	0.1	0.4	0.5	1.0	2.3	2.2	1.6
Asphalt: [a]							
Short tons	.....	.....	....	.....	.....	.....	.....
% of total	.....	.....	.....	.....	.....	.....	.....
Barite (Barytes):							
Short tons	21,000	20,000	25,104	22,101	21,782	18,387	19,806
% of total	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Carbon Black:							
Short ton	566,797	511,831	643,430	622,325	635,781	625,469	731,619
% of total	94.4	93.5	93.5	95.5	45.5	95.3	95.5
Clay, Kaolin:							
Short tons	241,052	247,431	257,223	268,157	301,185	282,493	322,875
% of total	12.8	13.2	11.9	12.0	14.0	12.7	12.7
Clay, Fire & Stoneware:							
Short tons	18,475	8,781	2,928	.....	.....	.....	.....
% of total	.2	.1	.2	.....	.....	.....	.....
Lime:							
Short tons	1,631	1,555	1,465	2,487	2,799	2,533	5,549
% of total	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Litharge:							
Short tons	2,230	1,768	1,947	2,266	1,298	1,247	1,808
% of total	1.4	1.3	1.3	1.7	1.7	1.4	1.0
Lithopone:							
Short tons	1,723	1,701	2,163	2,000[e]	.....	.....	.....
% of total	3.3	3.9	5.0	5.0	.....	.....	.....
Mica, Ground:							
Short tons	5,668	5,021	7,339	7,021	8,579	9,622	12,101
% of total	7.8	6.3	6.9	8.0	9.0	9.9	11.5
Sulfur:							
Short tons	89,600	84,000	89,600	89,600	89,600[e]	.....	.....
% of total	1.4	1.3	1.2	1.1	1.1	.....	.....
Talc: [b]							
Short tons	61,408	58,139	38,309	30,253	28,532	36,889	42,187
% of total	10.0	9.7	5.4	5.0	6.0	6.5	5.4
Zinc Oxide:							
Short tons	78,439	71,058	86,677	80,459	81,745	68,176	79,505
% of total	52.7	50.7	51.5	51.9	54.0	50.1	51.5

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber
(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1943	304,058 [c]	291,082	59.6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,352	18.2	13,021	29,323
1958	259,809	248,156	18.2	11,362	29,063
1959	303,479	286,410	20.0	11,757	27,738
1960	293,106	278,763	17.9	13,678	33,048
1960:					
Jan.	26,532	26,540	18.9	1,106	29,031
Feb.	27,085	25,944	18.6	1,258	28,653
Mar.	29,114	26,625	18.4	1,542	29,719
Apr.	26,221	24,210	18.2	1,248	30,916
May	25,676	23,763	17.8	1,167	32,611
June	25,516	24,677	17.8	1,164	31,699
July	21,512	19,249	16.8	1,384	33,624
Aug.	23,540	21,452	16.3	951	33,979
Sept.	22,306	22,101	17.8	1,028	33,949
Oct.	23,546	23,269	18.5	804	33,519
Nov.	22,023	21,014	17.2	1,167	33,783
Dec.	20,010	19,921	17.8	859	33,048
1961:					
Jan.	22,528	22,052	18.2	1,084	33,101
Feb.	19,724	18,550	17.0	....	33,493

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 67 tons of imports. (c) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Not Woven	Production: Rayon Tire Cord Woven	Production: Cotton and Nylon Cord & Fabric [a]	Production: Chafer Fabrics (all fibers)	Production: Total Tire Cord and Fabric	Stocks [b]: Cotton and Nylon Cord & Fabric	Stocks [b]: Rayon Cord and Fabric
1960:							
Jan.-Mar.	68,699	68,699	45,461	11,389	116,816	15,676	36,841
Apr.-June	64,692	64,692	49,841	10,527	117,299	15,337	33,905
July-Sept.	51,830	51,833	39,299	7,728	93,101	18,347	31,191
Oct.-Dec.	54,388	54,388	34,438	7,217	91,223	16,532	25,143
Total	239,609	239,609	169,039	36,856	418,439	65,892	127,080
1961:							
Jan.-Mar.	56,287	56,287	37,459	8,738	90,736	14,580	25,574
Apr.-June	....	.....	.....	.....	.....	.....	.....
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1955	1956	1957	1958	1959	1960	1961
Jan.	96,397	100,642	109,295	107,281	114,720	111,311	114,455
Feb.	88,464	98,088	96,694	95,516	99,759	108,871	105,589
Mar.	105,684	112,412	113,166	108,914	118,995	120,497	126,592
Apr.	111,116	113,034	115,820	118,477	124,917	129,094	.....
May	115,707	123,560	124,325	125,137	127,049	129,952	.....
June	120,710	126,833	121,598	125,444	133,695	138,909	.....
July	115,653	120,708	130,251	130,903	137,141	135,838	.....
Aug.	121,816	125,847	128,808	129,925	132,875	138,371	.....
Sept.	113,379	111,574	113,567	120,389	130,264	128,530	.....
Oct.	112,558	119,204	119,334	125,097	120,858	126,242	.....
Nov.	109,212	112,113	107,705	110,587	116,056	124,855	.....
Dec.	111,034	108,096	112,691	120,305	123,587	124,937	.....
Total	1,321,730	1,372,116	1,393,254	1,417,975	1,479,907	1,517,407	.....

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Gutta: Tons	Gutta-Percha & Other Gutta: Value
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1958	745	536,820	1,501	1,698,840	157	224,499
1959	1,512	1,350,843	1,296	1,608,986	268	311,178
1960	2,531	2,632,102	941	1,026,244	320	528,916
1960:						
Mar.	47	42,000	37	44,269	4	15,197
Apr.	56	35,560	97	104,711	18	33,181
May	86	79,553	76	88,209	64	90,252
June	75	59,506	128	142,962	35	45,136
July	108	144,740	68	76,761	24	56,317
Aug.	207	213,484	88	99,726	35	55,090
Sept.	960	540,589	26	27,889	28	38,363
Oct.	420	659,078	39	41,574	11	13,230
Nov.	365	534,852	51	58,977	29	74,331
Dec.	26	64,983	82	97,396	13	37,166
1961:						
Jan.	117	221,468	31	35,439	39	91,191
Feb.	54	94,584	84	106,564	19	45,083
Mar.	45	74,157	42	57,455	1	9,081

Source: U. S. Department of Commerce.

Gaps in Your Technical Library?
Contact the Book Department
RUBBER AGE
101 West 31st St., New York 1, N. Y.

a technique for producing IDEAS

One of the giants of creative advertising wrote a book some twenty years ago under the title that heads this page. Although the very idea may seem strange at first, it does work.

Reduced to its bare bones, the technique goes something like this: Gather all possible information on a problem, think hard about it, then put it out of your conscious mind. Finally, you'll find ideas coming to you.

There's no question but that it works and we recommend both the process and the book.* No reason why it won't work on just about any given subject. Including rubber chemistry. And the problems of running a rubber shop.

If you've got problems—and if you haven't, then you're not in the rubber business—you can get launched on the first phase of Idea-Producing by surrounding yourself with information on your problems.

And that's where you need RUBBER AGE!

RUBBER AGE is devoted exclusively to information on rubber problems. It represents a tailor-made way of getting over the first step in the process. Then you're ready for the other steps.

But first things first. Read RUBBER AGE. If you don't already have a personal subscription, get one. It's only $5 a year. You mail the coupon below and we'll supply the raw material for your rubber ideas for the next twelve months. Fair enough?

* The author, by the way, is James Webb Young and, although we sell all kinds of books, we do *not* handle this one. It's available (Ninth Edition) for $2 from Advertising Publications, Inc., 200 East Illinois St., Chicago, Ill.

Date .....

RUBBER AGE,
101 West 31st St., New York 1, N. Y.

OK, Rubber Age, let's start the ideas coming. I'll try a year's subscription. Here's my $5(*).

Name ..... Title .....

Company .....

Street ..... Zone ..... State .....

Company's Products .....

(*)Canada, $5.50, All Other $6.

761

CLASSIFIED WANT ADS

RATES:
All Classifications (except Positions Wanted):
25c per word in light face type—Minimum, $9.00
30c per word in bold face type—Minimum, $9.00
Positions Wanted: (Light face type only)
$1.00 for 20 words or less; extra words, 10c each
When Box Number is used, add 5 words to word count

Heading on separate line, $2.50 in light face; $3.00 in bold face.
Advertisements in borders: Available in display units (multiples of ⅛ page) at display rates.
All Classified Advertising must be paid in advance except for advertisers on contract. Send check with copy.
Replies to keyed advertisements will be forwarded via ordinary mail to advertiser without charge.

Address all replies to Box Numbers care of RUBBER AGE, 101 West 31st St., New York 1, N. Y.

Copy for August 1961, issue must be received by Tuesday, July 25

POSITIONS WANTED

TEXTILE CHEMIST, B.S. Degree, Age 34. Experience: Latex dips for chafer fabric, compounding nonwoven binders, application research, product development, production control in dyeing, printing and finishing. Desires responsible job in East or Midwest. Address Box R-673-P, RUBBER AGE.

EXECUTIVE PRODUCT DEVELOPER: Sixteen years diversified experience all phases mechanical rubber goods manufacture as development engineer and chief chemist. Challenging, responsible position desired. B S Che, M S Mgmt. Engrg., age 37, married. Presently employed. Address Box R-684-P, RUBBER AGE.

TECHNOLOGIST—Graduate, plus 20 years molded mechanical specification compound and proprietary product development, supervision. Address Box R-695-P, RUBBER AGE.

SUPERINTENDENT, PRODUCTION. Many years experience in latex dipping, compounding and molding. Three years research and development work. Desires contact with small or medium size company prefer South or Southwest. Address Box R-696-P, RUBBER AGE.

HELP WANTED

GRADUATE RUBBER TECHNOLOGIST 35-45 years old, personable. Heavy experience in compounding stereo specific polybutadiene for tires, etc. Responsible position in technical service laboratory with some travel for customer contact. Address Box R-690-H, RUBBER AGE.

TECHNICAL SALES SYNTHETIC AND RECLAIM RUBBER
Excellent opportunity with established worldwide organization. Engineering degree not required if prospect has good practical knowledge of rubber compounding with several years experience. Age 25/35 preferable but not essential. French national residing in North America and desirous of going back. To be situated Paris. State qualifications, salary expected. Discretion assured. Address Box R-694-H, RUBBER AGE.

RUBBER COMPOUNDER
Eastern tire manufacturer has opening for a passenger-truck tire compounder. Prefer graduate chemist or chemical engineer with a minimum of 8 years passenger and truck tire development compounding. Also prefer a person with factory experience which might entail knowledge of mixing, calendering, dipping, tread rubber, tire building, bag-o-matic curing, etc. Liberal employee benefits. Write qualifications, etc. Address Box R-697-H, RUBBER AGE.

ASSISTANT CHEMIST COMPOUNDER with at least 5 years experience in custom rubber manufacturing of calendered, molded, lathe cut and extruded goods. Unusual opportunity for man with technical know-how and personal ambition.
WEST AMERICAN RUBBER CO.
410 N. AVENUE 19, LOS ANGELES 31, CALIFORNIA

TIRE PLANT PERSONNEL—Growth opportunity with national tire manufacturer for personnel with technical, engineering, compounding and tire construction experience. Eventual west coast location. Send resume of education, experience and salary requirements in confidence to Box R-698-H, RUBBER AGE.

MATERIALS CHEMIST

This is the kind of an opportunity a man with technical background and experience in Rubber compounding, rubber and plastics materials development and application waits for. It is a newly-created position with a rapidly growing Midwest manufacturer of industrial equipment. First assignment will be to set up laboratory facility to conduct materials application development work.

This company is dedicated to growth and desires to extend its operations by means of proper use of new rubber compounds and plastics materials applied to its expanding "product lines for fluid systems". This is a rare opportunity for an aggressive technical man to advance in product development work.

Salary will be commensurate with your experience, and potential in this position. Stock option opportunities available.

Box R-692-H, RUBBER AGE

HELP WANTED—Continued

CHEMIST

Nationally known rubber company with division in Southern New England has opening for Rubber Chemist experienced in closed cell sponge. Excellent opportunity, good salary, full company paid benefit program. Reply stating experience and salary requirements.

Address Box R-685-H, RUBBER AGE

— WANTED —
TECHNICAL SALESMAN

Excellent opportunity with recognized and growing supplier to the rubber industry, with headquarters in Akron, Ohio. Excellent chances for advancement. A minimum of three years compounding or testing experience. A degree in Chemistry or Chemical Engineering desirable. Sales experience desirable, but not mandatory, as applicant selected will be given training tailored to his individual needs. Position will require extensive travel. Salary open. Submit complete resumé of education, experience, and salary requirements in first letter.

Address: Box R-689-H, Rubber Age.

CHEMISTS — CHEMICAL ENGINEERS
ADMINISTRATIVE — TECHNICAL
Our National, Confidential Service invites your investigation!
TOP CHEMICAL POSITIONS AT ALL LEVELS.
Call, write, or wire:—T. P. WHITE (Consultant)
DRAKE PERSONNEL, INC.
29 East Madison Building, Chicago 2, Ill.
FInancial 6-8700

EXECUTIVE TECHNICAL SALES OFFICE
Nelson EMPLOYMENT SERVICE
specialist for the "Rubber Industry"
HAROLD NELSON — PHONE: FRANKLIN 6-6861
600 FIRST NATIONAL TOWER — AKRON 8, OHIO

Directory of CONSULTANTS

SOUTH FLORIDA TEST SERVICE, INC.
(Established 1931)
Corrosion, weathering and sunlight tests. Four locations in Southern Florida for inland, salt atmospheric, tidewater and total immersion exposure tests.
4301 N. W. 7th St., Miami 44, Florida

THE MOORE LABORATORIES
Consulting • Testing • Rubber Chemicals Evaluated Functionally
Products Developed to Specification • Polymeric Compounding
P. O. Box 142 HAMILTON SQUARE, N. J. Telephone: JUniper 7-9055

HALE AND KULLGREN
Specialists in Process and Plants for Rubber and Plastics
A Complete Engineering Service including: Economic Surveys; Process Design; Installation; Contracting and Operation.
613 E. Tallmadge Ave., Akron 10, Ohio, FRanklin 6-7161

55-10* Prevents Rubber Stocks from Sticking to Mills, Blades, Calenders.

«««« »»»»

55-10* A Versatile Material—
- **Speeds Mixing Time**
- **Aids Mold Flow**
- **Reduces Rejects**

«««« »»»»

SWEETMAN'S LABORATORIES, INC.
P. O. Box 1257, Paterson, N. J.
* Pat. Pending

AUGUST 31

is
the closing date
for the

1962 RUBBER RED BOOK

Reserve your
advertising space
today.

RUBBER RED BOOK

101 West 31st Street,
New York 1, N. Y.
PE 6-6872

BUSINESS OPPORTUNITIES

BLACK

Master Batching
Mixing of all kinds
BESTREAD PRODUCTS CO. STOUGHTON, MASS.

CUSTOM MIXING
Black and Colored Rubber and Plastics
TWO BANBURYS • COMPLETE LABORATORY
Rush service on short notice
BURTON RUBBER PROCESSING, INC.
Middlefield Road Burton Ohio TEmple 4 8850
26-01

MIXING

To Your Specification

K. B. C. INDUSTRIES, INC. **NEW HAVEN, CONN.**
881 State St. Tel: State 7-5662
Otto J. Lang, General Manager

CUSTOM COMPOUNDING

We have facilities to handle all your rubber compounding requirements. If needed, certifications can be issued to guarantee these compounds to any and all specifications. Check us for the best in service, quality and price. Telephone BE 5-2588.

HANOVER INDUSTRIES, INC.
BOX 78
MERIDEN, CONNECTICUT

CORK

GRANULATED TO SPECIFICATIONS

MARYLAND CORK COMPANY, INC.
414 Aurora Federal Building Charles & Saratoga Sts.
Baltimore 1, Maryland

REMEMBER to show the box number on the envelope when writing to classified advertisers—that's the only way we can identify the advertisers to whom you are writing.

Address your letters to—

Box Number (show number)
c/o RUBBER AGE
101 West 31st Street
New York 1, N. Y.

The leaders know HOWE

Pirelli, for example, uses the HOWE Automatic Carcass Cutter, to eliminate skiving, reclaim uncontaminated rubber and lower handling costs.

See HOWE for all V-belt building equipment.

Phone: GR 3-3234

HOWE MACHINERY CO., INC.
30 Gregory Avenue
Passaic, New Jersey

ALBERT, MACHINERY and REPLACEMENT PARTS are synonymous to the rubber industry

P. E. ALBERT & SON
21 Nottingham Way Trenton 3, New Jersey Phone: EXport 4-7181

THE MAGIC NUMBER FOR MIRACLE EQUIPMENT "BUYS" IS STERLING 8-4672

F-B Banbury Mixers, #00, #11
Unused 2 Roll Mills, 14" x 30"
F-B Mills, 18" x 54", 22" x 60"
3 Roll Calenders, 6" x 18", 22" x 60"
Hartig 4½" and 6" Extruders.
NRM 2½" Oil Heated Extruder.
Welding Engrs. 2" Twin Screws.
Royle 2" & NRM 1½" Extruders
B. & J. Rotary Cutters; 3 sizes
Stokes 150 Ton Molding Press
Hydr. Rubber Cutter, 30" Wide.
Hydr. Presses, 7 to 500 Ton.
Preform Presses, Autoclaves,
Ball Mills, Blenders, Dryers.

Inquire about the FMC Rental-Purchase Plan

FIRST MACHINERY CORP.
209-289 TENTH ST., BROOKLYN 15, N. Y. ST. 8-4672
Cable: "Effemcy"

REBUILT to be worthy of the name **EEMCO**

REPAIR PARTS
GEARS • MOTORS

MANY LATE & CURRENT MODELS • REQUEST OUR MONTHLY LIST OF MILLS MIXERS • EXTRUDERS & PRESSES

SERVING INDUSTRY SINCE 1878

erie engine & mfg. co.
ERIE, PENNSYLVANIA . . . PHONE GL 4-7111

we who BUILD can best REBUILD

Get Bolling's extensive list of used and rebuilt rubber and plastic processing machinery and accessories. Examples:

CALENDER, rebuilt, 24" x 66", drive to suit.

PRESS, 2-ram up-moving, 1350-ton, 60" x 64"

Get new complete list of equipment.

Stewart Bolling & Company, Inc.
WE BUY USED EQUIPMENT

Rebuilt Machinery Department
Phone: MIchigan 1-2850
3190 E. 65th STREET
CLEVELAND 27, OHIO

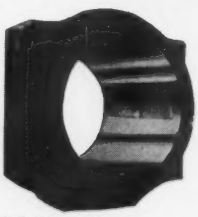
SPECIAL SALE

1 15 x 48 Farrel Mill 75 H. P. motor, magnetic brake automatic lubrication
2 150 ton 30 x 62" Farquhar Gap presses
Lancaster iron works batch mixer
Patterson Kelley 4 quart twin shell dry blender
Ransone machine lab. mixer
H P M 9 ounce hydraulic plastic Injection Moulding Machine

Guaranteed
NEW • USED • REBUILT MACHINERY
21 SHERMAN ST. • WORCESTER, MASS.

DIVISION OF SHERMAN RUBBER MACHINERY CO. BOTWINIK BROTHERS OF MASS., INC.

HEAVY RUBBER & PLASTIC MACHINERY



Rebuilt Bearing . . .
Part of N.E.E. Service

- Rebuilt
- Installed
- Repaired

Complete job done right in your plant. No supervision required. 30 years experience in servicing mills, mixers, calenders, tubers, etc.

Metal spraying jobs welcomed. Used equipment bought and sold.

WRITE — WIRE — PHONE TODAY

New England Engineering Co., Inc.
P.O. Box 465, Derby, Conn. REgent 5-6441

EQUIPMENT WANTED

WANTED

Used 48" to 60" Cameron Slitter. Must be in fairly new condition. Address Box R-686-W, RUBBER AGE.

WANTED: Rotary knife chopper such as Ball & Jewel, Cumberland, Foremost or Abbe, with 40 to 50 H. P. 220/440. Also Attrition Mill such as Susan or Foremost with 75 to 100 H. P. 220/440. Also other components to complete scrap rubber grinding system. To be used by a manufacturer. State lowest cash price, condition, and descriptive specs and/or photos. Address Box R-687-W, RUBBER AGE.

WANTED

1 USED Baker Perkins sigma blade mixer, jacketed, capacity 200 to 300 gallons.
1 USED 500 to 750 gallon capacity, jacketed, heavy duty ribbon blender.
Above equipment must be in good working condition.
Write or phone:

J. W. Taylor
c/o DAUBERT CHEMICAL COMPANY
4700 South Central Ave.
Chicago 38, Illinois
Phone — Ludlow 2-1000

EQUIPMENT FOR SALE

FOR SALE: 1—Thropp 18" x 50" 2-roll mill 125 HP; 1—Thropp 6" x 12" 2-roll mill 7½ HP; 2—No. 18 Cumberland rotary cutters; 1—No. 1 B&J rotary cutter; 3—Baker-Perkins sigma blade jacketed mixers 150, 100 and 50 gal.; 3—Mikro-Pulverizers, bantam, 1SH and 1SI; 6—Stokes preform presses, models R, T, DD2, DDS2, DS3 and D4; partial listing, send for details. BRILL EQUIPMENT CO., 37-61 Jabez St., Newark 5, N. J., Tel.: Market 3-7420.

TUBER—John Royle #3; 4½" screw; steam & water jacketed; #3 Reeves Drive; 15 HP, 220/440 V, 3 ph., 60 cy. motor.
KETTLE—48" dia. x 28" depth; 200 lb. working pressure.
CROSSHEAD for NRM 3½" Extruder; serial TCH 1235 12-52; electrically heated.
PACIFIC MOULDED PRODUCTS CO., 905 E. 59th Street, Los Angeles 1, California.

FOR SALE: Baker Perkins #16-UUEM, 150 gal. jacketed dispersion mixer, 150 HP XP drive, vaulted cover. Baker Perkins T347SS jacketed dispersion blade mixer. (1) Baker Perkins #15-UUMM, 100 gal. dispersion mixer, 100 HP, compression cover, jacketed, cored blades. 43—Baker Perkins #17, 200 gal. jacketed mixers, sigma or duplex blades, individual 30 HP motors, drives, power screw tilts, 2—Baker Perkins 100 gal., 150 gal., sigma blades jacketed. Prices are lower than ever before—Phone or Wire Collect for Details. PERRY, 1409 North Sixth St., Philadelphia 22, Penna., PO 3-3505.

FOR SALE: 6—1000 ton Aetna standard hydraulic rubber molding presses, 36" x 36" electrically heated platens, adaptable to either transfer or compression molding, & complete with temperature controls & cycle timers. Address Box R-688-S, RUBBER AGE.

FOR SALE: One recently overhauled No. 3 Banbury mixer complete with drive, 150 HP motor, controls, hood and apron conveyor. Address Box R-691-S, RUBBER AGE.

One Synchronous motor, Westinghouse 100 hp 720 rpm for sale; Reasonable. Address Box R-693-S, RUBBER AGE.

FOR SALE: Royle—4½" rubber extruder, steam or oil heated with 30 H. P. variable speed drive — 220/440 V. 3 phase. Excellent buy at $950. H & R PLASTICS INDUSTRIES, INC., Nazareth, Pa.

FOR SALE

1—#3-A Banbury mixer, 200 HP.
1—22" x 60" Farrel mill, 100 HP.
1—10" x 24"—3 roll calender, 15 HP.
1—125 gallon Day gearless pony mixer, 10 HP.
1—18" x 48" Farrel 3 roll calender.

CHEMICAL & PROCESS MACHINERY CORP.
52 9th Street, Brooklyn 15, N. Y. HY 9-7200

★★★

Will your listings
in the 1962 RUBBER RED BOOK be complete?

Have you reported changes in . . .

- ★ **PRODUCTS**
- ★ **PERSONNEL**
- ★ **PLANTS**
- ★ **SERVICES**
- ★ **FACILITIES**

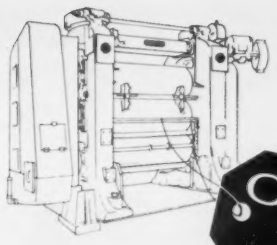
that have occurred since you submitted your forms?

If not, write or phone today.

RUBBER RED BOOK 101 West 31st Street, New York 1, New York PEnnsylvania 6-6872

★★★

MR/208



COOLED by MAYER

SPECIALISTS . . .
IN INDUSTRIAL COOLING
For Over 90 Years

Bulletins on Request

MAYER REFRIGERATING ENGINEERS, INC.
LINCOLN PARK, NEW JERSEY • OXbow 4-7100

MILLS—22x22x60", 22x20x60", 18x18x54", 24", 36", 40", 48" motor and drive.
PRESSES—24x24"-21" ram, 42x42"-24" ram, 60x60"-24" ram, other sizes.
CALENDERS—3 roll, 22x68", 18x36", 12x24", motor and drive.
EXTRUDERS—"Royle" #½, #1, #2, #3, #4, also 8", 10" & 12" strainers.
BANBURY MIXERS—sizes #B, #00, #1, #9, #11.
New 3 x 8", 6 x 13", and 8 x 16" Reliable laboratory mills & calenders. 6 x 6" self contained laboratory presses, electric platens.
New Reliable Guillotine Rubber Bale Cutters
Laboratory mixers, "Baker Perkins"—4 gal.—double arm stainless steel, jacketed, W & P 150 gallon, jacketed, with motors. 15 gallon and 20 gallon pony mixers, 1500# Ribbon Blenders.
Used machines are offered fully rebuilt and guaranteed.
We buy and sell all types of rubber machinery.

Reliable
RUBBER & PLASTIC MACHINERY CO. INC.
2014 UNION TURNPIKE NORTH BERGEN, N. J.
PHONE: UNION 5-1073

2200 Ton Birdsboro Heavy Duty Rubber Mat Presses. Bed size 7' x 5'. Each press contains two 25" diameter rams. Complete with Intensifiers for 4000 PSI.

Farrel-Birmingham Roll Grinder. 36" x 240". 20 HP motor. Two 20" diameter grinding wheels with 7½ HP motor. Can be inspected under power.

BELT PRESSES—1000 Ton Birmingham with sixteen 12" dia. rams. 3 steam platens, 16 feet long x 46½". 15" stroke, 2 openings. —1500 Ton R.D. Wood, three 18" dia. up-moving rams x 36" stroke. Bed size 50" x 240".

National Erie 3½" Extruder, steam heated.

165 HP Vapor Clarkson Package Steam Boiler. 300 PSI Working Pressure. Complete with all controls.

EEmco 3 opening 24" x 30" Hydraulic Presses. 16" dia. rams.

Royle #2, 3¼" Rubber Extruder.

Span Grinder, complete with 25 HP motor.

Aetna 5 ft. x 10 ft. Steam Vulcanizer. With quick opening type door. Clean Job.

We carry a complete line of Mixers, Vulcanizers, Calenders, Churns, Bale Cutters and other Allied Equipment for the Rubber Industry.

WE WILL FINANCE

What do you need? What do you have for sale?

JOHNSON MACHINERY COMPANY
90 Elizabeth Avenue
Elizabeth, New Jersey
ELizabeth 5-2300

We Specialize In Plant Liquidations And Purchases

ARMACO

Specializing in supplying used, reconditioned and new Rubber and Plastics machinery. NEW lab. mills, presses, bale cutters, extruders, vulcanizers. We purchase surplus machinery or complete plant.

AKRON RUBBER MACHINERY CO., INC.
200 S. Forge St., Akron 9, Ohio, Phone HEmlock 4-9141

Suppliers...

This message, concerning a subject of vital importance to you, is proudly presented by the publishers of

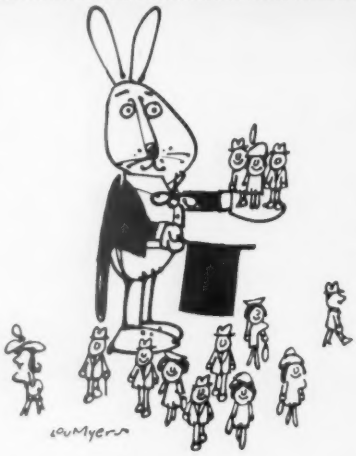
RUBBER AGE

A

MEMBER OF

Associated Business Publications

—a trade association of major publishers, devoted to the constant need for editorial superiority, and bound by the common belief that such an end is best brought about by adherence to the principle of paid circulation.



PUSH-BUTTON NUMBERS

The sad part about push-button circulation figures is that the advertiser pays for them—and pays handsomely. And the cost of tickets to The Numbers Game, already pretty high, goes up every time a publisher pushes a button and says: "Add another 3,000 names, George."

In ABP businesspapers, on the other hand, no amount of button pushing is going to produce 3,000 circulation —for *this* circulation has to be paid for . . . and new subscribers just don't jump into line when a publisher pushes a button. Advertising rates that go up at a publisher's decision are somehow harder to swallow than those that rise in response to reader demand.

We have nothing against numbers, understand—when they have dollar signs attached. But we feel that numbers *per se* are not the be-all and end-all in judging publication values. And we go so far as to say that a man who pays $x to subscribe to a publication is more meaningful, even as a sheer number, than one who pays nothing. He wants the publication more than he wants $x.

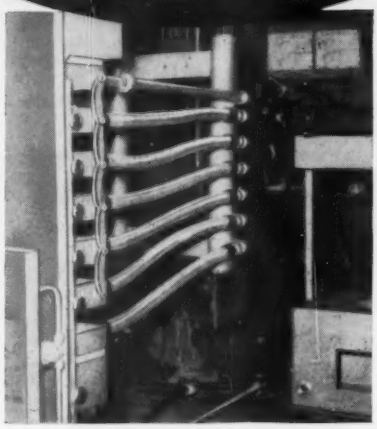
If you feel, as an advertiser, that the reader should meet you half way by *paying* for a publication, you can be sure you're putting your money on the right numbers when you put it in publications bearing this symbol:

THE ASSOCIATED BUSINESS PUBLICATIONS ABP

The plus value of paid circulation is "wantedness"

PENFLEX

PUTS LONG LIFE FLEXIBILITY IN PRESS LINES



PENFLEX CONNECTORS STAND WEAR . . . TEAR HEAT . . . FLEXING

Heat . . . cold . . . pressure . . . open . . . close . . . these are the constant operating conditions encountered by the tube conveying the steam under pressure in the platen presses. Many flexible tubes failed prematurely until Penflex wire braided flexible metallic tubing was installed. Now, tubing lasts up to four times longer than previous products used.
Are the flexible tubes on your platen presses failing too soon? Costing you extra dollars in replacement . . . not to say the time lost for maintenance. Then you want to get the Penflex story . . . the Job-Proved, pre-tested flexible metallic tubing that has outlasted others by as much as four times. It is the tubing that can save you dollars and hours of extra production on your tire lines. Get the facts and data book. Write to

PENNSYLVANIA FLEXIBLE METALLIC TUBING COMPANY
Paoli, Pa.

Advertisers in this Issue

Accurate Products Co., Inc. 608
Adamson United Co. 603
Air Reduction Co., Inc. 586
Akron Rubber Machinery Co., Inc. 705
Albert, P. E., & Son 704
Alcon Tool Co. 682
American Synthetic Rubber Corp. 565
American Zinc Sales Co. 580
Applied Science of Rubber 553
Atlas Electric Devices Co. 672

Bestread Products Co. 703
Bolling, Stewart, & Co., Inc. 704
Borg-Warner Corp., Marbon Chemical Div. ... 607
Brooklyn Color Works, Inc. 691
Burton Rubber Processing, Inc. 703

Cabot Corporation ..... Insert 567-72
Carter Bell Manufacturing Co. 679
Chemical & Process Machinery Corp. 705
Chemische Werke Huls AG 604-05
CLASSIFIED ADVERTISING 702-05
Cleveland Liner & Manufacturing Co. 708
Columbia Southern Chemicals Corp.... Insert 614-15
(see Pittsburgh Plate Glass, Chemical Div.)
Columbian Carbon Co. 588-89
CONSULTANTS SECTION 703
Continental Carbon Co. 600-01
Copolymer Rubber & Chemical Corp... Insert 674-75
Coulter, James, Machine Co. 562

D. P. R., Inc. 681
Dow Corning Corp. 613; 659
Drake Personnel, Inc. 702
du Pont de Nemours, E. I., & Co., Inc.
Elastomer Chemicals Dept. ..... Third Cover
Freon Products Div. 549

Eagle-Picher Co. 687
Eastman Chemical Products, Inc. 609
Eastman Machine Co. 695
Engineering Design 678
Enjay Chemical Co. ..... Insert 582-83
Erie Engine & Manufacturing Co. 704

Ferry Machine Co. 681
Firestone Synthetic Rubber & Latex Co. 587
First Machinery Corp. 704

General Electric Co.
Silicone Products Dept. ..... Fourth Cover
General Tire & Rubber Co.
Chemical Div. 542-43
Gillies, Duncan M., Co., Inc. 691
Goodman, G. F., & Son 681
Goodrich, B. F., Chemical Co. 537
Goodrich-Gulf Chemicals, Inc. ..... Insert 555-58
Goodyear Tire & Rubber Co.
Chemical Div. ..... Insert 545-46
Gummi-Asbest-Kunststoffe 687

Hale and Kullgren 703
Hall, C. P., Co. 606
Hanover Industries, Inc. 703
Harchem Div.—Wallace & Tiernan, Inc. 581
Howe Machinery Co., Inc. 704
Huber, J. M., Corp. 540
Humble Oil & Refining Co.
Enjay Chemical Div. ..... Insert 582-83

Industrial Ovens, Inc. 669

Johnson Machinery Co. 705

K.B.C. Industries, Inc. 703
KVP Sutherland Paper Co. 538
Kaumagraph Co. 677
Ketjen Carbon 602

Lehmann, J. M. Co.
William R. Thropp & Sons Div. 687

Marbon Chemical Div., Borg-Warner Corp. ... 607
Maryland Cork Co., Inc. 703
Mayer Refrigerating Engineers, Inc. 705
McNeil Machine & Engineering Co. 554
Midland-Ross Corp.
J. O. Ross Engineering Div. 548
Moore Laboratories 703
Mount Vernon Mills, Inc. 673
Muehlstein, H., & Co., Inc. 547

Naugatuck Chemical Division,
U. S. Rubber Co. 616
Nederlandsch Verkoopkantoor Voor
Chemische Producten N.V. 602
Nelson Employment Service 702
Neville Chemical Co. 579
New England Engineering Co., Inc. 704
New Jersey Zinc Co. 596

Ozone Research & Equipment Corp. 562

Paterson Parchment Paper Co. 661
Pennsalt Chemicals Corp. 566
Pennsylvania Flexible Metallic Tubing Co. 706
Phillips Chemical Co. ..... Insert 594-95
Pike, S. J., Co. 676
Pittsburgh Plate Glass Co.,
Chemical Div. ..... Insert 614-15
Pure Carbonic Co. Div.,
Air Reduction Co., Inc. 586

Randall, Frank E., Co., Inc. 684
Reliable Rubber & Plastic Machinery Co., Inc. 705
Richardson, Sid, Carbon Co. 611
Ross, J. O., Engineering Div. 548
Royle, John & Sons 573
Rubber Age 592
Rubber Formulary 561
Rubber Red Book 598
Rubber Trends 590

Sargent's, C. G., Sons Corp. 657
Scott Testers, Inc. 552
Shaw, Francis & Co., Ltd. 593
Shell Chemical Corp.,
Synthetic Chemical Div. ..... Second Cover
Sherman Rubber Machinery Co. Div. 704
Shore Instrument & Mfg. Co., Inc. 695
Siempelkamp, G., & Co. 689
Singer-Fidelity, Inc. 597
Skelly Oil Co. 685
South Florida Test Service Inc. 703
Soviet Rubber Technology 693
Stamford Rubber Supply Co. 612
Sweetman's Laboratories, Inc. 703

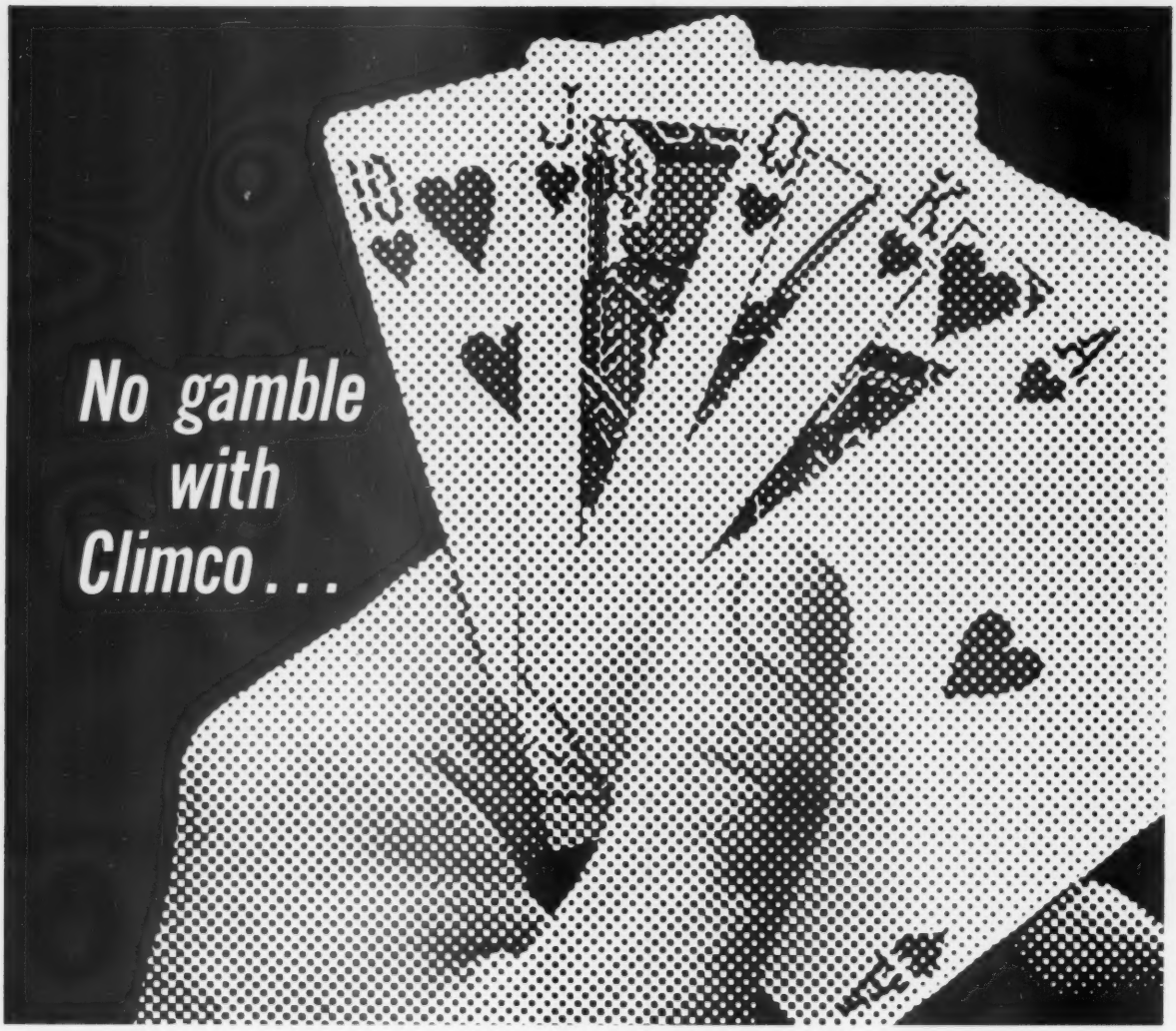
Taylor Instrument Companies 584
Taylor Instrument Co. (Ohio) Inc. 564
Taylor, Stiles & Co. 686
Texas-U. S. Chemical Co. 550-51
Thiokol Chemical Corp. 591
Thropp, William R., & Sons Div. 687
Titanium Pigment Corp. 671
Turner Halsey Co. 673

United Carbon Co., Inc. 574-76
United Shoe Machinery Corp. 683
U. S. Rubber Co.
Naugatuck Chemical Co. 616
Universal Oil Products Co. 563
Utility Manufacturing Co. 684

Vanderbilt, R. T., Co. Inc. ..... Front Cover
Velsicol Chemical Corp. 599

Wallace & Tiernan, Inc., Harchem Div. 581
Wellington Sears Co. 665
Witco-Chemical Co., Inc.
Continental Carbon Co. 600-01
White, J. J., Products Co. 695
Williams, C. K., & Co., Inc. 610

BUCKNER PRINTING CO.
EAST STROUDSBURG, PA.



LINERETTE PAPER

always wins perfect "ply-up"

You're ahead in time *and* money with Linerette separating paper to ply up frictioned stock. Specially processed Linerette contains no oil or wax, prevents adhesion, preserves tack, leaves no cloth marks and ensures fast, clean separation. In die-cutting operations, clippings can be worked away with regular scrap; where cleanliness is essential, Linerette is a low-cost lining for trays and containers. You can feed frictioned stock direct from calendar into Linerette and ship it that way too!

Along with these advantages, Linerette Paper has versatility in size as well. It is available in any width up to and including 54", in rolls of 9", 11½", 13" and 15" diameters, on cores of 3" i.d. The yield is approximately six square yards to the pound. A 9" roll contains approximately 375 linear yards and a 15" diameter approximately 1150 linear yards. Odds are that you can benefit right now with Linerette. Ask for sample and prices today; just specify the width required.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio • U.S.A.
Cable Address: "BLUELINER"

FREE BOOKLET
Send for the complete story today on Climco Processing.

CLIMCO

PROCESSED LINERS AND LINERETTE INTERLEAVING PAPER

Du Pont means *UNIFORMITY* in Rubber Chemicals

Du Pont rubber chemicals are made to exacting standards of quality and reliability to meet rigid inspection controls.

That's why you, like so many leading manufacturers, can depend on Du Pont rubber chemicals to meet your most rigorous requirements.

This is part of Du Pont's continuing effort to provide you with dependable rubber chemicals of the highest quality and uniformity.

Accelerators	Stabilizers	Special-purpose Chemicals
Antioxidants	Peptizing Agents	Rubber Dispersed Colors
Mold Lubricants	Blowing Agents	Reclaiming Chemicals

DU PONT

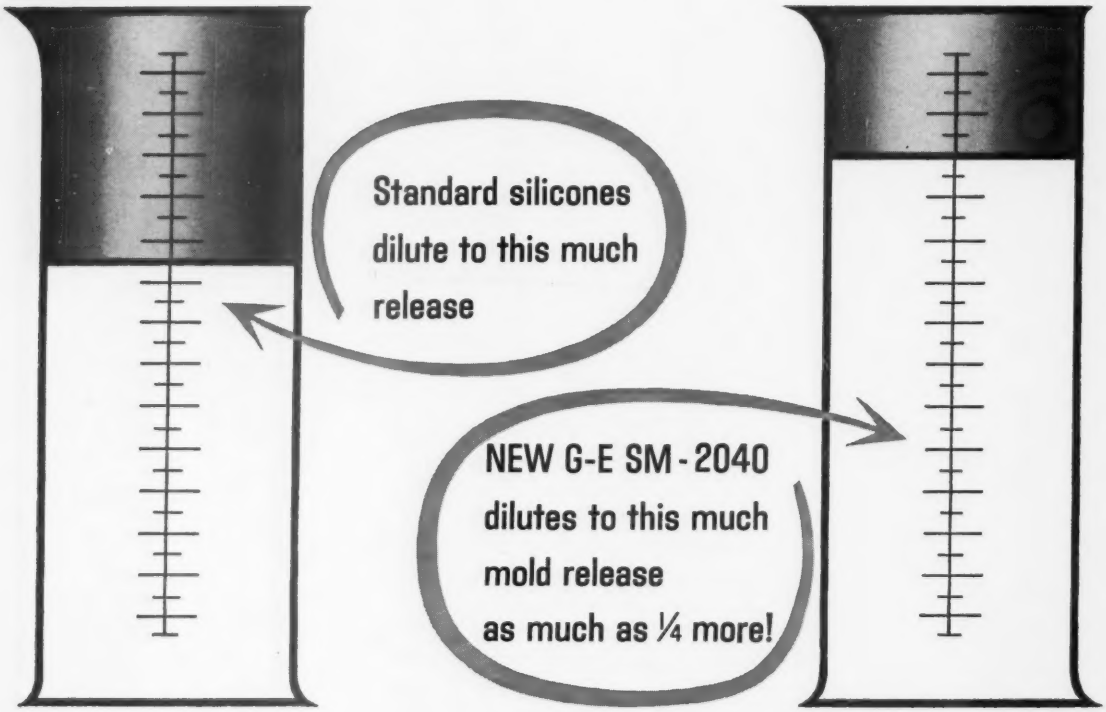
ELASTOMER CHEMICALS DEPARTMENT

RUBBER CHEMICALS

Better Things for Better Living . . . *through Chemistry*

SILICONES

Cut mold-release costs up to 25%



New General Electric SM-2040 silicone emulsion gives easier release, cleaner molds, drier, brighter surface . . . at cost savings up to 25 percent

Designed for maximum economy in rubber and plastic mold-release applications, new General Electric SM-2040 flows easily for complete and uniform coverage—with minimum transfer to the molded goods. You use less silicone and save as much as 25% (see table).

Dilution and freeze-thaw stability are excellent. SM-2040 contains no organic solvents or additives and only a minimum of emulsifier. Build-up of organic residue is greatly reduced so that molds and dies stay clean longer.

SM-2040 is now available from the General Electric Silicone Products Dept. or the Harwick Standard Chemical Company.

For additional information and a free test sample, write General Electric Company, Silicone Products Dept., Section HH750, Waterford, N. Y.

If you now dilute a gallon of conventional silicone emulsion with this much water:	Mold spray cost/gallon	You can dilute a gallon of G-E SM-2040 with this much water:	Mold spray cost/gallon
35 gal.	25¢	45 gal.	19½¢
70 gal.	12½¢	90 gal.	10¢
100 gal.	9¢	130 gal.	7¢

GENERAL ELECTRIC

5

45th YEAR

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

AUGUST, 1961

In This Issue

► Incorporation and dispersion of compounding ingredients page 791

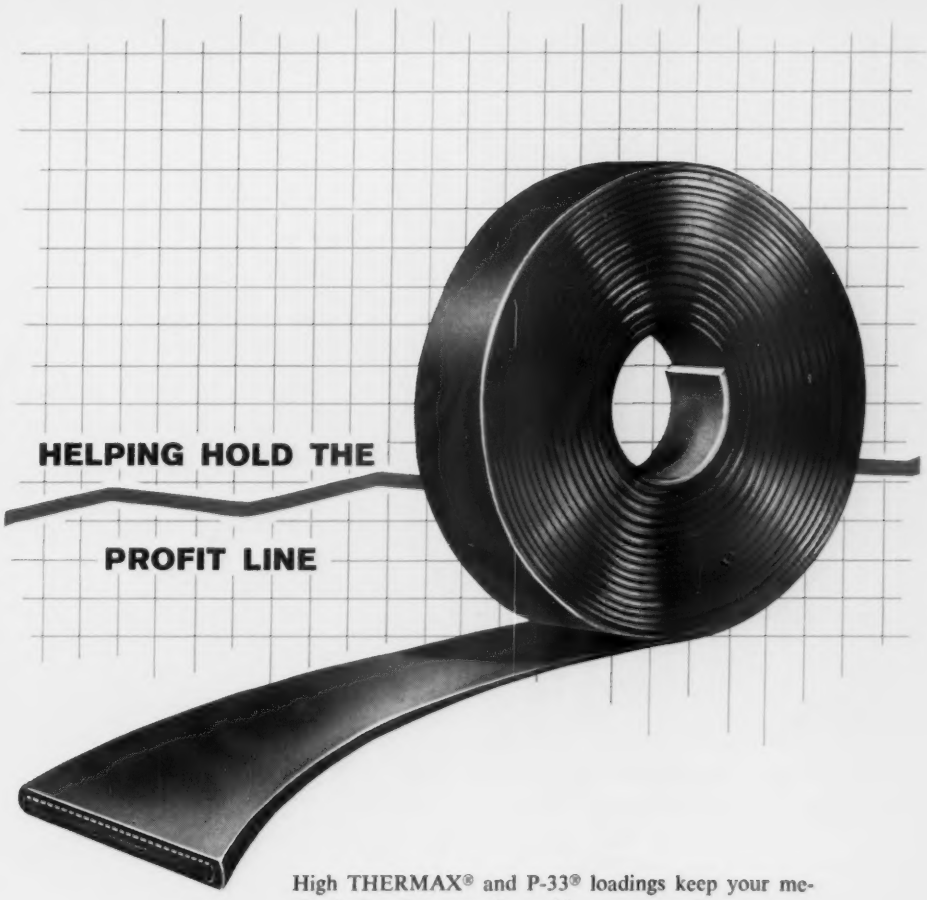
► Knitted fabric reinforcement — a new technique page 800

► Abstracts of papers to be given at Chicago RD meeting page 801

► QC testing of rubber gaskets page 810

Special Report
Executive Compensation
page 814

Contents ... page 715



High THERMAX® and P-33® loadings keep your mechanical and automotive rubber compound costs competitive in today's market, and add selling points in quality that comes with their use.

Specify FLOFORM® and you receive our pelletized materials, easier and cleaner handling, higher in bulk density to conserve storage space.

R. T. Vanderbilt Company, Inc.

230 PARK AVENUE • NEW YORK 17